Interface Definition

RISH Master 3440*i*/3440*iDL* 0.2S

as per IEC62053-22



DIGITAL MULTIFUNCTION INSTRUMENT
Installation & Operating Instructions

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1. Introduction

This instrument is a panel mounted 96 x 96mm DIN Quadratic Digital metering system for the measurement of important electrical parameters like AC voltage, AC Current, Frequency, Power, Energy(Active / Reactive / Apparent) . The instrument integrates accurate measurement of technology (All Voltage & Current measurements are True RMS upto 15th Harmonic) with 320x240 Pixels touch screen TFT LCD display. This instrument can be configured and programmed at site for the following:

PT Primary, PT Secondary, CT Primary, CT Secondary (5A or1A) and 3 phase 3W or 3 Phase 4W system.

The front panel has a 3.5" Touch Screen through which the user can move across the available measurement readings, reset the energy, Min/Max (System Voltage and System Current) and configure the product settings.

An operation via standard RS485 is possible. Through this optional interface all the above mentioned parameters can be configured and programmed. For bus service it is essential that device address, baud rate and parity should be configured properly.

This document specifies only the interface between a master device and this instrument for electrical variable through MODBUS over RS485.

2. Communication Parameter Selection :

After entering in the "COMMUNICATION PARAMETERS" list of following parameters will be displayed : 2.1 RS485 ADDRESS 2.2 RS485 BAUD RATE 2.3 RS485 PARITY

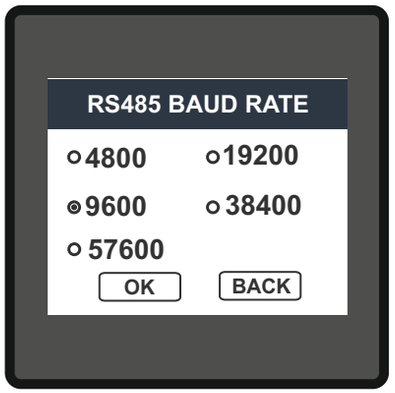
2.1 RS 485 Address Setting



This screen applies to the RS 485 output only. This screen allows the user to set RS485 address parameter for the instrument.
This screen can be accessed only from Communication Parameters List menu.
The range of allowable address is 1 to 247.

If value outside the range is entered, it will display "INVALID VALUE" followed by the correct range of parameter.

2.2 RS 485 Baud Rate



This screen allows the user to set Baud Rate of RS 485 port.Four options: 2400, 4800, 9600, 19200 Bauds are displayed on screen. Touching radio button in front of particular option will select that option.
Touching the radio button in front of particular option will select that option.

2.3 RS 485 Parity & Stop bit Selection



This screen allows the user to set Parity & number of stop bits. Four options:
ODD PARITY WITH ONE STOP BIT,
NO PARITY WITH ONE STOP BIT,
NO PARITY WITH TWO STOP BITS,
EVEN PARITY WITH ONE STOP BIT are displayed on screen.
Touching radio button in front of particular option will select that option.

3. RS 485 (ModBus) Output :

This instrument supports MODBUS (RS485) RTU protocol(2-wire) .
Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained together. The screens should also be connected to the “Gnd” terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network. Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used.
The impedance of the termination load should match the impedance of the cable and be at both ends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.
RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS485 network. The permissible address range for the instrument is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

The maximum latency time for the instrument is 200ms i.e. this is the amount of time that can pass before the first response character is output.

After sending any query through software (of the Master), it must allow 300ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 300 ms, Master can ignore the previous query and can issue fresh query to the slave.

Each byte in RTU mode has following format:

	8-bit binary, hexadecimal 0-9, A-F 2 hexadecimal characters contained in each 8-bit field of the message
Format of Data Bytes	4 bytes (32 bits) per parameter. Floating point format (to IEEE 754) Most significant byte first (Alternative least significant byte first)
Error Checking Bytes	2 byte Cyclical Redundancy Check (CRC)
Byte format	1 start bit, 8 data bits, least significant bit sent first 1 bit for even/odd parity 1 stop bit if parity is used; 1 or 2 bits if no parity

Communication Baud Rate is user selectable from the front panel between 4800,9600,19200,38400,57600 bps.

Function code :

03	Read Holding Registers	Read content of read /write location (4X)
04	Read input Registers	Read content of read only location (3X)
16	Presets Multiple Registers	Set the content of read / write locations (4X)

Exception Cases : An exception code will be generated when Meter receives ModBus query with valid parity & error check but which contains some other error (e.g. Attempt to set floating point variable to an invalid value) The response generated will be "Function code" ORed with HEX (80H). The exception codes are listed below

01	Illegal function	The function code is not supported by Meter
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of a floating point value
03	Illegal DataValue	Attempt to set a floating point variable to an invalid value

3.1 Accessing 3X and 4X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 1** for the addresses of 3X and 4X registers used for parameters measured by the instrument. Each parameter is held in the 3X as well as 4X registers. Modbus Code 04 and 03 are used to access all parameters in 3X and 4X registers respectively.

Example :

To read parameter,

Voltage2 from 3X: Start address= 00 02 Number of registers = 02

Watt2 from 4X: Start address= 00 0E Number of registers = 02

Note : Number of registers = Number of parameters x 2

Each Query for reading the data must be restricted to 40 parameters or less. Exceeding the 40 parameter limit will cause a ModBus exception code to be returned.

Query for 3X read:

01 (Hex)	04 (Hex)	00 (Hex)	02(Hex)	00 (Hex)	02(Hex)	30 (Hex)	0A (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

3X Response: Voltage 2 (219.254V)

01 (Hex)	04 (Hex)	04 (Hex)	43 (Hex)	5B (Hex)	41 (Hex)	21 (Hex)	6F (Hex)	9B (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count : Total number of data bytes received.

Query for 4X read:

01 (Hex)	03 (Hex)	00 (Hex)	0E(Hex)	00 (Hex)	02(Hex)	E0 (Hex)	C9 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

4X Response: Watt2 (2000 W)

01 (Hex)	03 (Hex)	04 (Hex)	44 (Hex)	FA (Hex)	00 (Hex)	00 (Hex)	CE (Hex)	F2 (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte count : No.of Bytes Demanded by user in querry.
Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
(Note : Two consecutive 16 bit register represent one parameter.)

TABLE 1 : 3 X and 4 X register addresses for measured parameters

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30001	40001	1	V1	00	00	00	00
30003	40003	2	V2	00	02	00	02
30005	40005	3	V3	00	04	00	04
30007	40007	4	I1	00	06	00	06
30009	40009	5	I2	00	08	00	08
30011	40011	6	I3	00	0A	00	0A
30013	40013	7	W1	00	0C	00	0C
30015	40015	8	W2	00	0E	00	0E
30017	40017	9	W3	00	10	00	10
30019	40019	10	VA1	00	12	00	12
30021	40021	11	VA2	00	14	00	14
30023	40023	12	VA3	00	16	00	16
30025	40025	13	VAR1	00	18	00	18
30027	40027	14	VAR2	00	1A	00	1A
30029	40029	15	VAR3	00	1C	00	1C
30031	40031	16	PF1	00	1E	00	1E
30033	40033	17	PF2	00	20	00	20
30035	40035	18	PF3	00	22	00	22
30037	40037	19	Angle1	00	24	00	24
30039	40039	20	Angle2	00	26	00	26
30041	40041	21	Angle3	00	28	00	28
30043	40043	22	Volt Avg	00	2A	00	2A
30045	40045	23	Volt Sum	00	2C	00	2C
30047	40047	24	Current Avg	00	2E	00	2E
30049	40049	25	Current Sum	00	30	00	30
30051	40051	26	Watt Avg	00	32	00	32
30053	40053	27	Watt Sum	00	34	00	34
30055	40055	28	VA Avg	00	36	00	36
30057	40057	29	VA Sum	00	38	00	38
30059	40059	30	VAr Avg	00	3A	00	3A

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30061	40061	31	VAr Sum	00	3C	00	3C
30063	40063	32	PF Avg	00	3E	00	3E
30065	40065	33	PF Sum	00	40	00	40
30067	40067	34	Phase Angle Avg	00	42	00	42
30069	40069	35	Phase Angle Sum	00	44	00	44
30071	40071	36	Freq	00	46	00	46
30073	40073	37	Wh import	00	48	00	48
30075	40075	38	Wh export	00	4A	00	4A
30077	40077	39	VArh Capacitive	00	4C	00	4C
30079	40079	40	VArh Inductive	00	4E	00	4E
30081	40081	41	VAh	00	50	00	50
30085	40085	43	kW imp demand	00	54	00	54
30087	40087	44	max kW imp demand	00	56	00	56
30089	40089	45	kW exp demand	00	58	00	58
30091	40091	46	max kW exp demand	00	5A	00	5A
30093	40093	47	kVAr Cap. demand	00	5C	00	5C
30095	40095	48	max kVAr Cap. demand	00	5E	00	5E
30097	40097	49	kVAr Ind. demand	00	60	00	60
30099	40099	50	max kVAr Ind. demand	00	62	00	62
30101	40101	51	KVA demand	00	64	00	64
30103	40103	52	max KVA demand	00	66	00	66
30105	40105	53	current demand	00	68	00	68
30107	40107	54	max current demand	00	6A	00	6A
30109	40109	55	Wh import Overflow count	00	6C	00	6C
30111	40111	56	Wh Import	00	6E	00	6E
30113	40113	57	Wh export Overflow count	00	70	00	70
30115	40115	58	Wh export	00	72	00	72
30117	40117	59	VArh Cap. Overflow count	00	74	00	74
30119	40119	60	VArh Capacitive	00	76	00	76
30121	40121	61	VArh Ind. Overflow count	00	78	00	78

TABLE 1 : Continued...

Address (3X)	Address (4X)	Para. No.	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30123	40123	62	VARh Inductive	00	7A	00	7A
30125	40125	63	VAh Overflow count	00	7C	00	7C
30127	40127	64	VAh	00	7E	00	7E
30133	40133	67	System Voltage Max	00	84	00	84
30135	40135	68	System Voltage Min	00	86	00	86
30137	40137	69	RPM	00	88	00	88
30139	40139	70	Impulse Rate	00	8A	00	8A
30141	40141	71	System Current Max	00	8C	00	8C
30143	40143	72	System Current Min	00	8E	00	8E
30145	40145	73	Wh imp. depending on update rate*	00	90	00	90
30147	40147	74	Wh exp. depending on update rate*	00	92	00	92
30149	40149	75	VArh cap. depending on update rate*	00	94	00	94
30151	40151	76	VArh ind. depending on update rate*	00	96	00	96
30153	40153	77	VAh depending on update rate*	00	98	00	98
30157	40157	79	Wh imp OFC depending on update rate*	00	9C	00	9C
30159	40159	80	Wh exp OFC depending on update rate*	00	9E	00	9E
30161	40161	81	VArh Cap. OFC depending on update rate *	00	A0	00	A0
30163	40163	82	VArh Ind. OFC depending on update rate *	00	A2	00	A2
30165	40165	83	VAh OFC depending on update rate*	00	A4	00	A4
30201	40201	101	V12	00	C8	00	C8
30203	40203	102	V23	00	CA	00	CA
30205	40205	103	V31	00	CC	00	CC
30207	40207	104	VTHD-R	00	CE	00	CE
30209	40209	105	VTHD-Y	00	D0	00	D0
30211	40211	106	VTHD-B	00	D2	00	D2
30213	40213	107	ITHD-R	00	D4	00	D4
30215	40215	108	ITHD-Y	00	D6	00	D6
30217	40217	109	ITHD-B	00	D8	00	D8
30219	40219	110	System V-THD	00	DA	00	DA

*Note:The values are updated depending on update rate which is settabe by user. For example, if user set update rate 15 min, then the values on these registers (marked with *) will get updated on every 15 min.

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30221	40221	111	System I-THD	00	DC	00	DC
30225	40225	113	Neutral Current	00	E0	00	E0
30227	40227	114	Run hour	00	E2	00	E2
30229	40229	115	On Hour	00	E4	00	E4
30231	40231	116	No. of interrupts	00	E6	00	E6
30267	40267	134	Relay 1 status	01	0A	01	0A
30269	40269	135	Relay 2 status	01	0C	01	0C
30293	40293	147	RTC Minute#	01	24	01	24
30295	40295	148	RTC Hou#	01	26	01	26
30297	40297	149	RTC Day#	01	28	01	28
30299	40299	150	RTC Date#	01	2A	01	2A
30301	40301	151	RTC Month#	01	2C	01	2C
30303	40303	152	RTC Year#	01	2E	01	2E
30305	40305	153	RTC Complete date#	01	30	01	30
30307	40307	154	RTC Complete time#	01	32	01	32
30333	40333	167	Phase indicate	01	4C	01	4C
30345	40345	173	Power Down RTC Minute#	01	58	01	58
30347	40347	174	Power Down RTC Hour#	01	5A	01	5A
30349	40349	175	Power Down RTC Day#	01	5C	01	5C
30351	40351	176	Power Down RTC Date#	01	5E	01	5E
30353	40353	177	Power Down RTC Month#	01	60	01	60
30355	40355	178	Power Down RTC Year#	01	62	01	62
30357	40357	179	Timer 1 On delay#	01	64	01	64
30359	40359	180	Timer 2 On delay#	01	66	01	66
30361	40361	181	Timer 1 Off delay#	01	68	01	68
30363	40363	182	Timer 2 Off delay#	01	6A	01	6A
30365	40365	183	Timer 1 No. of Cycles#	01	6C	01	6C
30367	40367	184	Timer 2 No. of Cycles#	01	6E	01	6E
30401	40401	201	VR Harmonic-1	01	90	01	90
30403	40403	202	IR Harmonic-1	01	92	01	92

#Note:Parameters marked # are available for RM3440iDL only and not available for RM3440i.

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30405	40405	203	VR Harmonic-2	01	94	01	96
30407	40407	204	IR Harmonic-2	01	96	01	96
30409	40409	205	VR Harmonic-3	01	98	01	98
30411	40411	206	IR Harmonic-3	01	9A	01	9A
30413	40413	207	VR Harmonic-4	01	9C	01	9C
30415	40415	208	IR Harmonic-4	01	9E	01	9E
30417	40417	209	VR Harmonic-5	01	A0	01	A0
30419	40419	210	IR Harmonic-5	01	A2	01	A2
30421	40421	211	VR Harmonic-6	01	A4	01	A4
30423	40423	212	IR Harmonic-6	01	A6	01	A6
30425	40425	213	VR Harmonic-7	01	A8	01	A8
30427	40427	214	IR Harmonic-7	01	AA	01	AA
30429	40429	215	VR Harmonic-8	01	AC	01	AC
30431	40431	216	IR Harmonic-8	01	AE	01	AE
30433	40433	217	VR Harmonic-9	01	B0	01	B0
30435	40435	218	IR Harmonic-9	01	B2	01	B2
30437	40437	219	VR Harmonic-10	01	B4	01	B4
30439	40439	220	IR Harmonic-10	01	B6	01	B6
30441	40441	221	VR Harmonic-11	01	B8	01	B8
30443	40443	222	IR Harmonic-11	01	BA	01	BA
30445	40445	223	VR Harmonic-12	01	BC	01	BC
30447	40447	224	IR Harmonic-12	01	BE	01	BE
30449	40449	225	VR Harmonic-13	01	C0	01	C0
30451	40451	226	IR Harmonic-13	01	C2	01	C2
30453	40453	227	VR Harmonic-14	01	C4	01	C4
30455	40455	228	IR Harmonic-14	01	C6	01	C6
30457	40457	229	VR Harmonic-15	01	C8	01	C8
30459	40459	230	IR Harmonic-15	01	CA	01	CA
30461	40461	231	VR Harmonic-16	01	CC	01	CC
30463	40463	232	IR Harmonic-16	01	CE	01	CE
30465	40465	233	VR Harmonic-17	01	D0	01	D0

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30467	40467	234	IR Harmonic-17	01	D2	01	D2
30469	40469	235	VR Harmonic-18	01	D4	01	D4
30471	40471	236	IR Harmonic-18	01	D6	01	D6
30473	40473	237	VR Harmonic-19	01	D8	01	D8
30475	40475	238	IR Harmonic-19	01	DA	01	DA
30477	40477	239	VR Harmonic-20	01	DC	01	DC
30479	40479	240	IR Harmonic-20	01	DE	01	DE
30481	40481	241	VR Harmonic-21	01	E0	01	E0
30483	40483	242	IR Harmonic-21	01	E2	01	E2
30485	40485	243	VR Harmonic-22	01	E4	01	E4
30487	40487	244	IR Harmonic-22	01	E6	01	E6
30489	40489	245	VR Harmonic-23	01	E8	01	E8
30491	40491	246	IR Harmonic-23	01	EA	01	EA
30493	40493	247	VR Harmonic-24	01	EC	01	EC
30495	40495	248	IR Harmonic-24	01	EE	01	EE
30497	40497	249	VR Harmonic-25	01	F0	01	F0
30499	40499	250	IR Harmonic-25	01	F2	01	F2
30501	40501	251	VR Harmonic-26	01	F4	01	F4
30503	40503	252	IR Harmonic-26	01	F6	01	F6
30505	40505	253	VR Harmonic-27	01	F8	01	F8
30507	40507	254	IR Harmonic-27	01	FA	01	FA
30509	40509	255	VR Harmonic-28	01	FC	01	FC
30511	40511	256	IR Harmonic-28	01	FE	01	FE
30513	40513	257	VR Harmonic-29	02	00	02	00
30515	40515	258	IR Harmonic-29	02	02	02	02
30517	40517	259	VR Harmonic-30	02	04	02	04
30519	40519	260	IR Harmonic-30	02	06	02	06
30521	40521	261	VR Harmonic-31	02	08	02	08
30523	40523	262	IR Harmonic-31	02	0A	02	0A
30525	40525	263	VR Harmonic-32	02	0C	02	0C

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30527	40527	264	IR Harmonic-32	02	0E	02	0E
30529	40529	265	VY Harmonic-1	02	10	02	10
30531	40531	266	IY Harmonic-1	02	12	02	12
30533	40533	267	VY Harmonic-2	02	14	02	14
30535	40535	268	IY Harmonic-2	02	16	02	16
30537	40537	269	VY Harmonic-3	02	18	02	18
30539	40539	270	IY Harmonic-3	02	1A	02	1A
30541	40541	271	VY Harmonic-4	02	1C	02	1C
30543	40543	272	IY Harmonic-4	02	1E	02	1E
30545	40545	273	VY Harmonic-5	02	20	02	20
30547	40547	274	IY Harmonic-5	02	22	02	22
30549	40549	275	VY Harmonic-6	02	24	02	24
30551	40551	276	IY Harmonic-6	02	26	02	26
30553	40553	277	VY Harmonic-7	02	28	02	28
30555	40555	278	IY Harmonic-7	02	2A	02	2A
30557	40557	279	VY Harmonic-8	02	2C	02	2C
30559	40559	280	IY Harmonic-8	02	2E	02	2E
30561	40561	281	VY Harmonic-9	02	30	02	30
30563	40563	282	IY Harmonic-9	02	32	02	32
30565	40565	283	VY Harmonic-10	02	34	02	34
30567	40567	284	IY Harmonic-10	02	36	02	36
30569	40569	285	VY Harmonic-11	02	38	02	38
30571	40571	286	IY Harmonic-11	02	3A	02	3A
30573	40573	287	VY Harmonic-12	02	3C	02	3C
30575	40575	288	IY Harmonic-12	02	3E	02	3E
30577	40577	289	VY Harmonic-13	02	40	02	40
30579	40579	290	IY Harmonic-13	02	42	02	42
30581	40581	291	VY Harmonic-14	02	44	02	44
30583	40583	292	IY Harmonic-14	02	46	02	46
30585	40585	293	VY Harmonic-15	02	48	02	48

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30587	40587	294	IY Harmonic-15	02	4A	02	4A
30589	40589	295	VY Harmonic-16	02	4C	02	4C
30591	40591	296	IY Harmonic-16	02	4E	02	4E
30593	40593	297	VY Harmonic-17	02	50	02	50
30595	40595	298	IY Harmonic-17	02	52	02	52
30597	40597	299	VY Harmonic-18	02	54	02	54
30599	40599	300	IY Harmonic-18	02	56	02	56
30601	40601	301	VY Harmonic-19	02	58	02	58
30603	40603	302	IY Harmonic-19	02	5A	02	5A
30605	40605	303	VY Harmonic-20	02	5C	02	5C
30607	40607	304	IY Harmonic-20	02	5E	02	5E
30609	40609	305	VY Harmonic-21	02	60	02	60
30611	40611	306	IY Harmonic-21	02	62	02	62
30613	40613	307	VY Harmonic-22	02	64	02	64
30615	40615	308	IY Harmonic-22	02	66	02	66
30617	40617	309	VY Harmonic-23	02	68	02	68
30619	40619	310	IY Harmonic-23	02	6A	02	6A
30621	40621	311	VY Harmonic-24	02	6C	02	6C
30623	40623	312	IY Harmonic-24	02	6E	02	6E
30625	40625	313	VY Harmonic-25	02	70	02	70
30627	40627	314	IY Harmonic-25	02	72	02	72
30629	40629	315	VY Harmonic-26	02	74	02	74
30631	40631	316	IY Harmonic-26	02	76	02	76
30633	40633	317	VY Harmonic-27	02	78	02	78
30635	40635	318	IY Harmonic-27	02	7A	02	7A
30637	40637	319	VY Harmonic-28	02	7C	02	7C
30639	40639	320	IY Harmonic-28	02	7E	02	7E
30641	40641	321	VY Harmonic-29	02	80	02	80
30643	40643	322	IY Harmonic-29	02	82	02	82
30645	40645	323	VY Harmonic-30	02	84	02	84

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30647	40647	324	IY Harmonic-30	02	86	02	86
30649	40649	325	VY Harmonic-31	02	88	02	88
30651	40651	326	IY Harmonic-31	02	8A	02	8A
30653	40653	327	VY Harmonic-32	02	8C	02	8C
30655	40655	328	IY Harmonic-32	02	8E	02	8E
30657	40657	329	VB Harmonic-1	02	90	02	90
30659	40659	330	IB Harmonic-1	02	92	02	92
30661	40661	331	VB Harmonic-2	02	94	02	94
30663	40663	332	IB Harmonic-2	02	96	02	96
30665	40665	333	VB Harmonic-3	02	98	02	98
30667	40667	334	IB Harmonic-3	02	9A	02	9A
30669	40669	335	VB Harmonic-4	02	9C	02	9C
30671	40671	336	IB Harmonic-4	02	9E	02	9E
30673	40673	337	VB Harmonic-5	02	A0	02	A0
30675	40675	338	IB Harmonic-5	02	A2	02	A2
30677	40677	339	VB Harmonic-6	02	A4	02	A4
30679	40679	340	IB Harmonic-6	02	A6	02	A6
30681	40681	341	VB Harmonic-7	02	A8	02	A8
30683	40683	342	IB Harmonic-7	02	AA	02	AA
30685	40685	343	VB Harmonic-8	02	AC	02	AC
30687	40687	344	IB Harmonic-8	02	AE	02	AE
30689	40689	345	VB Harmonic-9	02	B0	02	B0
30691	40691	346	IB Harmonic-9	02	B2	02	B2
30693	40693	347	VB Harmonic-10	02	B4	02	B4
30695	40695	348	IB Harmonic-10	02	B6	02	B6
30697	40697	349	VB Harmonic-11	02	B8	02	B8
30699	40699	350	IB Harmonic-11	02	BA	02	BA
30701	40701	351	VB Harmonic-12	02	BC	02	BC
30703	40703	352	IB Harmonic-12	02	BE	02	BE
30705	40705	353	VB Harmonic-13	02	C0	02	C0

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30707	40707	354	IB Harmonic-13	02	C2	02	C2
30709	40709	355	VB Harmonic-14	02	C4	02	C4
30711	40711	356	IB Harmonic-14	02	C6	02	C6
30713	40713	357	VB Harmonic-15	02	C8	02	C8
30715	40715	358	IB Harmonic-15	02	CA	02	CA
30717	40717	359	VB Harmonic-16	02	CC	02	CC
30719	40719	360	IB Harmonic-16	02	CE	02	CE
30721	40721	361	VB Harmonic-17	02	D0	02	D0
30723	40723	362	IB Harmonic-17	02	D2	02	D2
30725	40725	363	VB Harmonic-18	02	D4	02	D4
30727	40727	364	IB Harmonic-18	02	D6	02	D6
30729	40729	365	VB Harmonic-19	02	D8	02	D8
30731	40731	366	IB Harmonic-19	02	DA	02	DA
30733	40733	367	VB Harmonic-20	02	DC	02	DC
30735	40735	368	IB Harmonic-20	02	DE	02	DE
30737	40737	369	VB Harmonic-21	02	E0	02	E0
30739	40739	370	IB Harmonic-21	02	E2	02	E2
30741	40741	371	VB Harmonic-22	02	E4	02	E4
30743	40743	372	IB Harmonic-22	02	E6	02	E6
30745	40745	373	VB Harmonic-23	02	E8	02	E8
30747	40747	374	IB Harmonic-23	02	EA	02	EA
30749	40749	375	VB Harmonic-24	02	EC	02	EC
30751	40751	376	IB Harmonic-24	02	EE	02	EE
30753	40753	377	VB Harmonic-25	02	F0	02	F0
30755	40755	378	IB Harmonic-25	02	F2	02	F2
30757	40757	379	VB Harmonic-26	02	F4	02	F4
30759	40759	380	IB Harmonic-26	02	F6	02	F6
30761	40761	381	VB Harmonic-27	02	F8	02	F8
30763	40763	382	IB Harmonic-27	02	FA	02	FA
30765	40765	383	VB Harmonic-28	02	FC	02	FC

TABLE 1 : Continued...

Address (3X)	Address (4X)	Parameter Number	Parameter	Start Address Hex 3X		Start Address Hex 4X	
				High Byte	Low Byte	High Byte	Low Byte
30767	40767	384	IB Harmonic-28	02	FE	02	FE
30769	40769	385	VB Harmonic-29	03	00	03	00
30771	40771	386	IB Harmonic-29	03	02	03	02
30773	40773	387	VB Harmonic-30	03	04	03	04
30775	40775	388	IB Harmonic-30	03	06	03	06
30777	40777	389	VB Harmonic-31	03	08	03	08
30779	40779	390	IB Harmonic-31	03	0A	03	0A
30781	40781	391	VB Harmonic-32	03	0C	03	0C
30783	40783	392	IB Harmonic-32	03	0E	03	0E

Note : 1. Parameters 1,2,3 are L-N Voltage for 3P 4W & L-L Voltage for 3P 3W.

2. Relay Output 1/ 2 Status shows whether relay is Energized or De-energized.

1 :- Relay Energized 0:- Relay De-energized

TABLE 2 : 3X and 4X register addresses for 32-bit Integer Energy

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			Hi Byte	Lo Byte	Hi Byte	Lo Byte
30801	40801	Active Energy Import	03	20	03	20
30803	40803	Active Energy Export	03	22	03	22
30805	40805	Reactive Energy Capacitive	03	24	03	24
30807	40807	Reactive Energy Inductive	03	26	03	26
30809	40809	Apparent Energy	03	28	03	28
30813	40813	Active Energy Import Overflow Count	03	2C	03	2C
30815	40815	Active Energy Export Overflow Count	03	2E	03	2E
30817	40817	Reactive Energy Cap. Overflow Count	03	30	03	30
30819	40819	Reactive Energy Ind. Overflow Count	03	32	03	32
30821	40821	Apparent Energy Overflow Count	03	34	03	34
30825	40825	Active Energy Import on time*	03	38	03	38
30827	40827	Active Energy Export on time*	03	3A	03	3A
30829	40829	Reactive Energy Cap. on time*	03	3C	03	3C

TABLE 2 : 3X and 4X register addresses for 32-bit Integer Energy

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex	
			Hi Byte	Lo Byte	Hi Byte	Lo Byte
30831	40831	Reactive Energy Imp. on time*	03	3E	03	3E
30833	40833	Apparent Energy on time*	03	40	03	40
30837	40837	Active Energy Imp Overflow Count on time*	03	44	03	44
30839	40839	Active Energy Exp Overflow Count on time*	03	46	03	46
30841	40841	Reac. Energy Cap. Overflow Count on time*	03	48	03	48
30843	40843	Reac. Energy Ind. Overflow Count on time*	03	4A	03	4A
30845	40845	Apparent Energy Overflow Count on time*	03	4C	03	4C

***Note:**

1. The values are updated depending on update rate which is settable by user.

For example, if user set update rate 15 min, then the values on these registers (marked with *) will get updated on every 15 min.

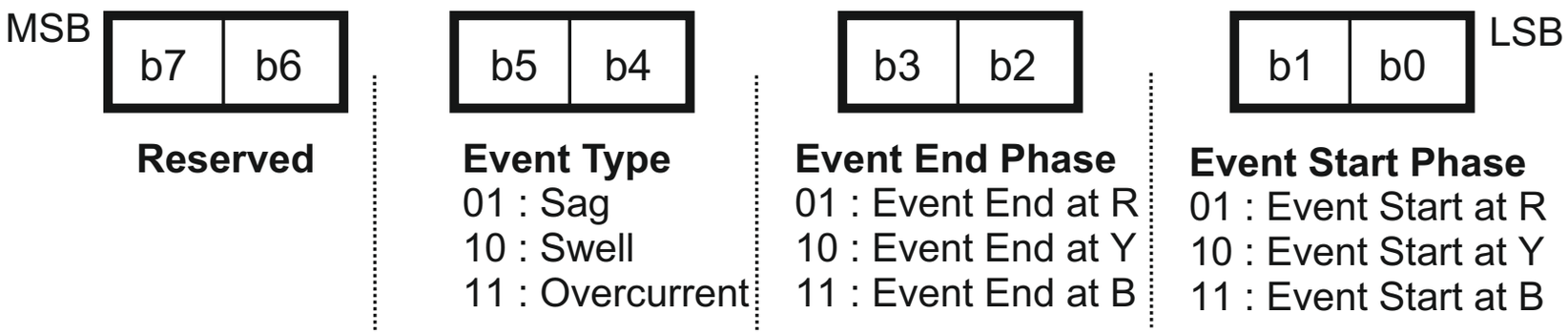
3.2 Accessing Sag, Swell, OverCurrent Data through MODBUS

The Power Quality parameters namely, Sag, Swell and Overcurrent log can be accessed from the addresses shown in **TABLE 3** for RM3440iDL only. Seven locations provide information about a single event. For example, for the 1st event, the following locations are used:

33001	Event 1 Start Time (HHMMSS)
33003	Event 1 Start Date (DDMMYY)
33005	Event 1 Duration (in seconds)
33007	Event 1 R Value (Min/Max Value at R Phase during event)
33009	Event 1 Y Value (Min/Max Value at Y Phase during event)
330011	Event 1 B Value (Min/Max Value at B Phase during event)
330013	Event 1 Info (Event Start Phase, Event End Phase, Event Type)

Event R, Y, B Values:
The 4th to 6th locations : Event R Value, Y Value and B Value give the minimum value in case of Sag and maximum value in case of Swell and Overcurrent at the corresponding phases.

Event Info:
The 7th location provides the following information when broken into bits:



The Event Start Phase indicates the phase which had the extreme value when the event started. Similarly, the Event End Phase indicates the phase which had the extreme value when the event closed. The extreme value corresponds to minimum value in case of Sag and Maximum value in case of Swell/Overcurrent.

Note: (1) In case of Powerfail before the closure of an event, the value of b3b2 will be 00, i.e., no end phase will be registered, while b1b0 will not be 00, i.e., start phase will get registered.
(2) In case of no event, all the bits of Event Info location will be 0.

Maximum 30 events can be stored at a time in FIFO manner. The Present Event Index at location 33421/43421 stores the value of index of the latest event that has started, e.g., if Sag event has started as 25th event, then the value of Present Event Index would be 25.

Note: In case no event has occurred, the value of Present Event Index will be 0.

TABLE 3 : 3X and 4X register addresses for Sag, Swell & Overcurrent log

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33001	43001	Event 1 Start Time	0B	B8	0B	B8
33003	43003	Event 1 Start Date	0B	BA	0B	BA
33005	43005	Event 1 Duration	0B	BC	0B	BC
33007	43007	Event 1 R Value	0B	BE	0B	BE
33009	43009	Event 1 Y Value	0B	C0	0B	C0
33011	43011	Event 1 B Value	0B	C2	0B	C2
33013	43013	Event 1 Info	0B	C4	0B	C4
33015	43015	Event 2 Start Time	0B	C6	0B	C6
33017	43017	Event 2 Start Date	0B	C8	0B	C8
33019	43019	Event 2 Duration	0B	CA	0B	CA
33021	43021	Event 2 R Value	0B	CC	0B	CC
33023	43023	Event 2 Y Value	0B	CE	0B	CE
33025	43025	Event 2 B Value	0B	D0	0B	D0
33027	43027	Event 2 Info	0B	D2	0B	D2
33029	43029	Event 3 Start Time	0B	D4	0B	D4
33031	43031	Event 3 Start Date	0B	D6	0B	D6
33033	43033	Event 3 Duration	0B	D8	0B	D8
33035	43035	Event 3 R Value	0B	DA	0B	DA
33037	43037	Event 3 Y Value	0B	DC	0B	DC
33039	43039	Event 3 B Value	0B	DE	0B	DE
33041	43041	Event 3 Info	0B	E0	0B	E0
33043	43043	Event 4 Start Time	0B	E2	0B	E2
33045	43045	Event 4 Start Date	0B	E4	0B	E4
33047	43047	Event 4 Duration	0B	E6	0B	E6
33049	43049	Event 4 R Value	0B	E8	0B	E8
33051	43051	Event 4 Y Value	0B	EA	0B	EA
33053	43053	Event 4 B Value	0B	EC	0B	EC
33055	43055	Event 4 Info	0B	EE	0B	EE
33057	43057	Event 5 Start Time	0B	F0	0B	F0
33059	43059	Event 5 Start Date	0B	F2	0B	F2

TABLE 3 : Continued...

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33061	43061	Event 5 Duration	0B	F4	0B	F4
33063	43063	Event 5 R Value	0B	F6	0B	F6
33065	43065	Event 5 Y Value	0B	F8	0B	F8
33067	43067	Event 5 B Value	0B	FA	0B	FA
33069	43069	Event 5 Info	0B	FC	0B	FC
33071	43071	Event 6 Start Time	0B	FE	0B	FE
33073	43073	Event 6 Start Date	0C	00	0C	00
33075	43075	Event 6 Duration	0C	02	0C	02
33077	43077	Event 6 R Value	0C	04	0C	04
33079	43079	Event 6 Y Value	0C	06	0C	06
33081	43081	Event 6 B Value	0C	08	0C	08
33083	43083	Event 6 Info	0C	0A	0C	0A
33085	43085	Event 7 Start Time	0C	0C	0C	0C
33087	43087	Event 7 Start Date	0C	0E	0C	0E
33089	43089	Event 7 Duration	0C	10	0C	10
33091	43091	Event 7 R Value	0C	12	0C	12
33093	43093	Event 7 Y Value	0C	14	0C	14
33095	43095	Event 7 B Value	0C	16	0C	16
33097	43097	Event 7 Info	0C	18	0C	18
33099	43099	Event 8 Start Time	0C	1A	0C	1A
33101	43101	Event 8 Start Date	0C	1C	0C	1C
33103	43103	Event 8 Duration	0C	1E	0C	1E
33105	43105	Event 8 R Value	0C	20	0C	20
33107	43107	Event 8 Y Value	0C	22	0C	22
33109	43109	Event 8 B Value	0C	24	0C	24
33111	43111	Event 8 Info	0C	26	0C	26
33113	43113	Event 9 Start Time	0C	28	0C	28
33115	43115	Event 9 Start Date	0C	2A	0C	2A
33117	43117	Event 9 Duration	0C	2C	0C	2C
33119	43119	Event 9 R Value	0C	2E	0C	2E

TABLE 3 : Continued...

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33121	43121	Event 9 Y Value	0C	30	0C	30
33123	43123	Event 9 B Value	0C	32	0C	32
33125	43125	Event 9 Info	0C	34	0C	34
33127	43127	Event 10 Start Time	0C	36	0C	36
33129	43129	Event 10 Start Date	0C	38	0C	38
33131	43131	Event 10 Duration	0C	3A	0C	3A
33133	43133	Event 10 R Value	0C	3C	0C	3C
33135	43135	Event 10 Y Value	0C	3E	0C	3E
33137	43137	Event 10 B Value	0C	40	0C	40
33139	43139	Event 10 Info	0C	42	0C	42
33141	43141	Event 11 Start Time	0C	44	0C	44
33143	43143	Event 11 Start Date	0C	46	0C	46
33145	43145	Event 11 Duration	0C	48	0C	48
33147	43147	Event 11 R Value	0C	4A	0C	4A
33149	43149	Event 11 Y Value	0C	4C	0C	4C
33151	43151	Event 11 B Value	0C	4E	0C	4E
33153	43153	Event 11 Info	0C	50	0C	50
33155	43155	Event 12 Start Time	0C	52	0C	52
33157	43157	Event 12 Start Date	0C	54	0C	54
33159	43159	Event 12 Duration	0C	56	0C	56
33161	43161	Event 12 R Value	0C	58	0C	58
33163	43163	Event 12 Y Value	0C	5A	0C	5A
33165	43165	Event 12 B Value	0C	5C	0C	5C
33167	43167	Event 12 Info	0C	5E	0C	5E
33169	43169	Event 13 Start Time	0C	60	0C	60
33171	43171	Event 13 Start Date	0C	62	0C	62
33173	43173	Event 13 Duration	0C	64	0C	64
33175	43175	Event 13 R Value	0C	66	0C	66
33177	43177	Event 13 Y Value	0C	68	0C	68
33179	43179	Event 13 B Value	0C	6A	0C	6A

TABLE 3 : Continued...

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33181	43181	Event 13 Info	0C	6C	0C	6C
33183	43183	Event 14 Start Time	0C	6E	0C	6E
33185	43185	Event 14 Start Date	0C	70	0C	70
33187	43187	Event 14 Duration	0C	72	0C	72
33189	43189	Event 14 R Value	0C	74	0C	74
33191	43191	Event 14 Y Value	0C	76	0C	76
33193	43193	Event 14 B Value	0C	78	0C	78
33195	43195	Event 14 Info	0C	7A	0C	7A
33197	43197	Event 15 Start Time	0C	7C	0C	7C
33199	43199	Event 15 Start Date	0C	7E	0C	7E
33201	43201	Event 15 Duration	0C	80	0C	80
33203	43203	Event 15 R Value	0C	82	0C	82
33205	43205	Event 15 Y Value	0C	84	0C	84
33207	43207	Event 15 B Value	0C	86	0C	86
33209	43209	Event 15 Info	0C	88	0C	88
33211	43211	Event 16 Start Time	0C	8A	0C	8A
33213	43213	Event 16 Start Date	0C	8C	0C	8C
33215	43215	Event 16 Duration	0C	8E	0C	8E
33217	43217	Event 16 R Value	0C	90	0C	90
33219	43219	Event 16 Y Value	0C	92	0C	92
33221	43221	Event 16 B Value	0C	94	0C	94
33223	43223	Event 16 Info	0C	96	0C	96
33225	43225	Event 17 Start Time	0C	98	0C	98
33227	43227	Event 17 Start Date	0C	9A	0C	9A
33229	43229	Event 17 Duration	0C	9C	0C	9C
33231	43231	Event 17 R Value	0C	9E	0C	9E
33233	43233	Event 17 Y Value	0C	A0	0C	A0
33235	43235	Event 17 B Value	0C	A2	0C	A2
33237	43237	Event 17 Info	0C	A4	0C	A4
33239	43239	Event 18 Start Time	0C	A6	0C	A6

TABLE 3 : Continued...

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33241	43241	Event 18 Start Date	0C	A8	0C	A8
33243	43243	Event 18 Duration	0C	AA	0C	AA
33245	43245	Event 18 R Value	0C	AC	0C	AC
33247	43247	Event 18 Y Value	0C	AE	0C	AE
33249	43249	Event 18 B Value	0C	B0	0C	B0
33251	43251	Event 18 Info	0C	B2	0C	B2
33253	43253	Event 19 Start Time	0C	B4	0C	B4
33255	43255	Event 19 Start Date	0C	B6	0C	B6
33257	43257	Event 19 Duration	0C	B8	0C	B8
33259	43259	Event 19 R Value	0C	BA	0C	BA
33261	43261	Event 19 Y Value	0C	BC	0C	BC
33263	43263	Event 19 B Value	0C	BE	0C	BE
33265	43265	Event 19 Info	0C	C0	0C	C0
33267	43267	Event 20 Start Time	0C	C2	0C	C2
33269	43269	Event 20 Start Date	0C	C4	0C	C4
33271	43271	Event 20 Duration	0C	C6	0C	C6
33273	43273	Event 20 R Value	0C	C8	0C	C8
33275	43275	Event 20 Y Value	0C	CA	0C	CA
33277	43277	Event 20 B Value	0C	CC	0C	CC
33279	43279	Event 20 Info	0C	CE	0C	CE
33281	43281	Event 21 Start Time	0C	D0	0C	D0
33283	43283	Event 21 Start Date	0C	D2	0C	D2
33285	43285	Event 21 Duration	0C	D4	0C	D4
33287	43287	Event 21 R Value	0C	D6	0C	D6
33289	43289	Event 21 Y Value	0C	D8	0C	D8
33291	43291	Event 21 B Value	0C	DA	0C	DA
33293	43293	Event 21 Info	0C	DC	0C	DC
33295	43295	Event 22 Start Time	0C	DE	0C	DE
33297	43297	Event 22 Start Date	0C	E0	0C	E0
33299	43299	Event 22 Duration	0C	E2	0C	E2

TABLE 3 : Continued...

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33301	43301	Event 22 R Value	0C	E4	0C	E4
33303	43303	Event 22 Y Value	0C	E6	0C	E6
33305	43305	Event 22 B Value	0C	E8	0C	E8
33307	43307	Event 22 Info	0C	EA	0C	EA
33309	43309	Event 23 Start Time	0C	EC	0C	EC
33311	43311	Event 23 Start Date	0C	EE	0C	EE
33313	43313	Event 23 Duration	0C	F0	0C	F0
33315	43315	Event 23 R Value	0C	F2	0C	F2
33317	43317	Event 23 Y Value	0C	F4	0C	F4
33319	43319	Event 23 B Value	0C	F6	0C	F6
33321	43321	Event 23 Info	0C	F8	0C	F8
33323	43323	Event 24 Start Time	0C	FA	0C	FA
33325	43325	Event 24 Start Date	0C	FC	0C	FC
33327	43327	Event 24 Duration	0C	FE	0C	FE
33329	43329	Event 24 R Value	0D	00	0D	00
33331	43331	Event 24 Y Value	0D	02	0D	02
33333	43333	Event 24 B Value	0D	04	0D	04
33335	43335	Event 24 Info	0D	06	0D	06
33337	43337	Event 25 Start Time	0D	08	0D	08
33339	43339	Event 25 Start Date	0D	0A	0D	0A
33341	43341	Event 25 Duration	0D	0C	0D	0C
33343	43343	Event 25 R Value	0D	0E	0D	0E
33345	43345	Event 25 Y Value	0D	10	0D	10
33347	43347	Event 25 B Value	0D	12	0D	12
33349	43349	Event 25 Info	0D	14	0D	14
33351	43351	Event 26 Start Time	0D	16	0D	16
33353	43353	Event 26 Start Date	0D	18	0D	18
33355	43355	Event 26 Duration	0D	1A	0D	1A
33357	43357	Event 26 R Value	0D	1C	0D	1C
33359	43359	Event 26 Y Value	0D	1E	0D	1E

TABLE 3 : Continued...

Address (3X)	Address (4X)	Parameter	Start Address Hex 3X		Start Address Hex 4X	
			High Byte	Low Byte	High Byte	Low Byte
33361	43361	Event 26 B Value	0D	20	0D	20
33363	43363	Event 26 Info	0D	22	0D	22
33365	43365	Event 27 Start Time	0D	24	0D	24
33367	43367	Event 27 Start Date	0D	26	0D	26
33369	43369	Event 27 Duration	0D	28	0D	28
33371	43371	Event 27 R Value	0D	2A	0D	2A
33373	43373	Event 27 Y Value	0D	2C	0D	2C
33375	43375	Event 27 B Value	0D	2E	0D	2E
33377	43377	Event 27 Info	0D	30	0D	30
33379	43379	Event 28 Start Time	0D	32	0D	32
33381	43381	Event 28 Start Date	0D	34	0D	34
33383	43383	Event 28 Duration	0D	36	0D	36
33385	43385	Event 28 R Value	0D	38	0D	38
33387	43387	Event 28 Y Value	0D	3A	0D	3A
33389	43389	Event 28 B Value	0D	3C	0D	3C
33391	43391	Event 28 Info	0D	3E	0D	3E
33393	43393	Event 29 Start Time	0D	40	0D	40
33395	43395	Event 29 Start Date	0D	42	0D	42
33397	43397	Event 29 Duration	0D	44	0D	44
33399	43399	Event 29 R Value	0D	46	0D	46
33401	43401	Event 29 Y Value	0D	48	0D	48
33403	43403	Event 29 B Value	0D	4A	0D	4A
33405	43405	Event 29 Info	0D	4C	0D	4C
33407	43407	Event 30 Start Time	0D	4E	0D	4E
33409	43409	Event 30 Start Date	0D	50	0D	50
33411	43411	Event 30 Duration	0D	52	0D	52
33413	43413	Event 30 R Value	0D	54	0D	54
33415	43415	Event 30 Y Value	0D	56	0D	56
33417	43417	Event 30 B Value	0D	58	0D	58
33419	43419	Event 30 Info	0D	5A	0D	5A
33421	43421	Present Event Index	0D	5C	0D	5C

3.3 Accessing 4 X register for Reading & Writing Settings:

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer **TABLE 4** for 4X Register addresses.

Example: Reading System type

System type: Start address = 177A (Hex)
Number of registers = 02
Note: Number of registers = Number of Parameters x 2

Query :

Device Address	01 (Hex)
Function Code	03 (Hex)
Start Address High	17 (Hex)
Start Address Low	7A (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	E4 (Hex)
CRC High	09 (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
(Note : Two consecutive 16 bit register represent one parameter.)

Response: System Type (3phase 4 wire = 3)

Device Address	01 (Hex)
Function Code	03 (Hex)
Byte Count	04 (Hex)
Data Register1 High Byte	40 (Hex)
Data Register1Low Byte	40 (Hex)
Data Register2 High Byte	00 (Hex)
Data Register2 Low Byte	00 (Hex)
CRC Low	EE (Hex)
CRC High	27 (Hex)

Byte Count : Total number of data bytes received.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
(Note : Two consecutive 16 bit register represent one parameter.)

Example : Writing System type

System type : Start address = 177A (Hex)
Number of registers = 02

Query:(Change System type to 3phase 3wire = 2)

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	17 (Hex)
Starting Address Lo	7A(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
Byte Count	04 (Hex)
Data Register-1High Byte	40 (Hex)
Data Register-1 Low Byte	00(Hex)
Data Register-2 High Byte	00(Hex)
Data Register-2 Low Byte	00(Hex)
CRC Low	66 (Hex)
CRC High	10 (Hex)

Byte Count : Total number of data bytes received.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
(Note : Two consecutive 16 bit register represent one parameter.)

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	17 (Hex)
Start Address Low	7A(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
CRC Low	61 (Hex)
CRC High	CA (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
(Note : Two consecutive 16 bit register represent one parameter.)

3.4 Accessing 4 X register for Long Energy Reading & Writing

For setting Energy start count in long energy format following Querry format should be used. For writing energy start count first send query to unlock the parameter

Query:(Query For Unlock to enter Active energy import)

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	03(Hex)
Starting Address Lo	20(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
Byte Count	04 (Hex)
Data Register-1High Byte	00 (Hex)
Data Register-1 Low Byte	00(Hex)
Data Register-2 High Byte	00(Hex)
Data Register-2 Low Byte	01(Hex)
CRC Low	66 (Hex)
CRC High	10 (Hex)

Byte Count : Total number of data bytes transmitted.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
(Note : Two consecutive 16 bit register represent one parameter.)

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	03 (Hex)
Start Address Low	20(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
CRC Low	61 (Hex)
CRC High	CA (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.

Once the unlock Query is send, send query for writing Enery start count.
For Example: Querry for writing energy start count of 999999999 for Active Import Energy
Note: refer table no. 10 for energy parameter selection.

Query:(Query enter Active energy import)

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	03(Hex)
Starting Address Lo	20(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
Byte Count	04 (Hex)
Data Register-1High Byte	3B (Hex)
Data Register-1 Low Byte	9A(Hex)
Data Register-2 High Byte	C9(Hex)
Data Register-2 Low Byte	FF(Hex)
CRC Low	66 (Hex)
CRC High	10 (Hex)

Byte Count : Total number of data bytes received.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
(Note : Two consecutive 16 bit register represent one parameter.)

Value(3B ,9A, C9,FF) reperesents 999999999.

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	03 (Hex)
Start Address Low	20(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
CRC Low	61 (Hex)
CRC High	CA (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.
(Note : Two consecutive 16 bit register represent one parameter.)

TABLE 4 : 4 X register addresses

Address (Register)	Param-eter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46003	1	Demand integration time	R/Wp	17	72	8
46005	2	Energy Resolution / unit	R/Wp	17	74	2
46011	5	System type	R/Wp	17	7A	3
46013	6	Pulse width	R/Wp	17	7C	100
46015	7	Reset parameters	R/Wp	17	7E	0
46017	8	No. of poles	R/Wp	17	80	2
46019	9	RS485 setup code	R/Wp	17	82	-
46021	10	Node address	R/Wp	17	84	1
46023	11	Pulse divisor	R/Wp	17	86	1
46027	13	Display energy	R/Wp	17	8A	1
46029	14	Analog Out 1 - Parameter Select	R/Wp	17	8C	0
46031	15	Analog Out 2 - Parameter Select	R/Wp	17	8E	0
46033	16	PT primary	R/Wp	17	90	415
46035	17	CT primary	R/Wp	17	92	5
46039	19	Energy digit reset count	R/Wp	17	96	8
46041	20	Register Order/Word Order	R/Wp	17	98	0
46043	21	CTSecondary	R/Wp	17	9A	5
46045	22	PTSecondary	R/Wp	17	9C	415
46047	23	Relay1 output select	R/Wp	17	9E	0
46049	24	Relay1 Parameter select/ No. of Cycles/Weekdays	R/Wp	17	A0	0
46051	25	Limit1 Trip point	R/Wp	17	A2	100
46053	26	Hysteresis(Limit1)	R/Wp	17	A4	0.5
46055	27	Relay1 ON(Energize) delay/ time	R/Wp	17	A6	1
46057	28	Relay1 OFF(Energize) delay/ time	R/Wp	17	A8	1
46059	29	Relay2 output select	R/Wp	17	AA	0
46061	30	Relay1 Parameter select/ No. of Cycles/Weekdays	R/Wp	17	AC	0
46063	31	Limit2 Trip point	R/Wp	17	AE	100
46065	32	Hysteresis(Limit2)	R/Wp	17	B0	0.5
46067	33	Relay2 ON(Energize) delay/ time	R/Wp	17	B2	1
46069	34	Relay2 Off(Energize) delay/ time	R/Wp	17	B4	1

TABLE 4 : continued...

Address (Register)	Param-eter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46071	35	Password	R/Wp	17	B6	0000
46073	36	Relay1 Configuration select	R/Wp	17	B8	0
46075	37	Relay2 Configuration select	R/Wp	17	BA	0
46077	38	Auto scroll	R/Wp	17	BC	0
46079	39	30mA Noise cuttoff	R/Wp	17	BE	0
46081	40	Update rate on MODBUS	R/Wp	17	C0	15
46083	41	Factory Reset Mode	R/Wp	17	C2	0
46087	43	System Frequency selection	R/Wp	17	C6	50
46089	44	Impulse on Energy Selection	R/Wp	17	C8	1
46091	45	Energy Para Select	R/Wp	17	CA	0
46093	46	Enter Energy Start Count	R/Wp	17	CC	0
46095	47	Timer 1 Start stop#	R/Wp	17	CE	0
46097	48	Timer 2 Start stop#	R/Wp	17	D0	0
46099	49	Model no.	R	17	D2	-
46127	63	RTC Complete Date#	R/Wp	17	EE	-
46129	64	RTC Complete Time#	R/Wp	17	F0	-
46131	65	RTC Day of week#	R	17	F2	0
46133	66	Brightness	R/Wp	17	F4	42
46135	67	Contrast	R/Wp	17	F6	9
46159	79	Red Color Code of Phase1	R/Wp	18	0E	160
46161	80	Green Color Code of Phase1	R/Wp	18	10	82
46163	81	Blue Color Code of Phase1	R/Wp	18	12	45
46165	82	Red Color Code of Phase2	R/Wp	18	14	0
46167	83	Green Color Code of Phase2	R/Wp	18	16	0
46169	84	Blue Color Code of Phase2	R/Wp	18	18	0
46171	85	Red Color Code of Phase3	R/Wp	18	1A	128
46173	86	Green Color Code of Phase3	R/Wp	18	1C	128
46175	87	Blue Color Code of Phase3	R/Wp	18	1E	128
46177	88	---	-	18	20	-

TABLE 4 : continued...

Address (Register)	Param-eter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46181	90	Version no.	R	18	24	-
46183	91	---	-	18	26	-
46185	92	Event-based Datalog Select#	R/Wp	18	28	0
46187	93	Time-based Datalog Select#	R/Wp	18	2A	0
46189	94	Time-based Datalog Interval Selection#	R/Wp	18	2C	1
46191	95	Logging Parameter Count#	R/Wp	18	2E	1
46193	96	Datalog Parameter 1#	R/Wp	18	30	0
46195	97	Datalog Parameter 2#	R/Wp	18	32	0
46197	98	Datalog Parameter 3#	R/Wp	18	34	0
46199	99	Datalog Parameter 4#	R/Wp	18	36	0
46201	100	Datalog Parameter 5#	R/Wp	18	38	0
46203	101	Datalog Parameter 6#	R/Wp	18	3A	0
46205	102	Datalog Parameter 7#	R/Wp	18	3C	0
46207	103	Datalog Parameter 8#	R/Wp	18	3E	0
46209	104	Datalog Parameter 9#	R/Wp	18	40	0
46211	105	Datalog Parameter 10#	R/Wp	18	42	0
46213	106	Datalog Parameter 11#	R/Wp	18	44	0
46215	107	Datalog Parameter 12#	R/Wp	18	46	0
46217	108	Datalog Parameter 13#	R/Wp	18	48	0
46219	109	Datalog Parameter 14#	R/Wp	18	4A	0
46221	110	Datalog Parameter 15#	R/Wp	18	4C	0
46223	111	Datalog Parameter 16#	R/Wp	18	4E	0
46225	112	Datalog Parameter 17#	R/Wp	18	50	0
46227	113	Datalog Parameter 18#	R/Wp	18	52	0
46229	114	Datalog Parameter 19#	R/Wp	18	54	0
46231	115	Datalog Parameter 20#	R/Wp	18	56	0
46233	116	Datalog Parameter 21#	R/Wp	18	58	0
46235	117	Datalog Parameter 22#	R/Wp	18	5A	0
46237	118	Datalog Parameter 23#	R/Wp	18	5C	0
46239	119	Datalog Parameter 24#	R/Wp	18	5E	0
46241	120	Datalog Parameter 25#	R/Wp	18	60	0

TABLE 4 : continued...

Address (Register)	Param-eter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
46243	121	Datalog Parameter 26#	R/Wp	18	62	0
46245	122	Datalog Parameter 27#	R/Wp	18	64	0
46247	123	Datalog Parameter 28#	R/Wp	18	66	0
46249	124	Datalog Parameter 29#	R/Wp	18	68	90
46251	125	Datalog Parameter 30#	R/Wp	18	6A	110
46253	126	Load Profile Datalog Select#	R/Wp	18	6C	2
46255	127	Start Date of Load Profile Datalog#	R	18	6E	110
46315	157	Sag Threshold#	R/Wp	18	AA	2
46317	158	Swell Threshold#	R/Wp	18	AC	0
46319	159	Sag & Swell Hysteresis#	R/Wp	18	AE	0
46321	160	Overcurrent Threshold#	R/Wp	18	B0	0
46323	161	Overcurrent Hysteresis#	R/Wp	18	B2	0
46357	178	IP address	R/Wp	18	D4	
46359	179	Subnet Mask	R/Wp	18	D6	
46361	180	Default gateway	R/Wp	18	D8	
46363	181	Server port	R/Wp	18	DA	

NOTE:(1) Wp - Write protected , R - Read only , R/Wp - Read & Write protected

(2) Description options/ Parameters marked # are available for RM3440iDL only and not for RM3440i.

Explanation for 4 X register :

NOTE: Writing any invalid values (non-applicable values) to any of the following locations will result in modbus error.

Address	Parameter	Description
46003	Demand Integration Time	Demand period represents demand time in minutes. The applicable values are 8,15,20 or 30.
46005	Energy Resolution	This address is used to set energy output in Wh,kWh & MWh. Write one of the following value to this address. **1:** Energy in Wh. **2:** Energy in KWh. **3**: Energy in MWh.
46011	System Type	This address is used to set the System type. Write one of the following value to this address. **1**: 1 Phase 2 Wire **2**: 3 Phase 3 Wire **3**: 3 Phase 4 Wire**.**

Address	Parameter	Description
46013	Pulse Width of Relay	This address is used to set **pulse width** of the Pulse output. Write one of the following values to this address: **60** : 60 ms **100** : 100 ms **200** : 200 ms
46015	Reset Parameters	This address is used to reset different parameters. Write specific value to this register to reset the corresponding parameter. Following are the values to reset various data. **1:** Energy Reset **2:** Demand Reset **3:** System Min Values Reset **4:** System Max Values Reset **5:** Run hour & On hour Reset **6:** No of Interruptions Reset **7:** Reset All data **8:** Time Datalog Reset# **9:** Load Profile Datalog Reset# **10:** Sag Log Reset# **11:** Swell Log Reset# **12:** Overcurrent Log Reset#
46017	Number of Poles	This address is used to set the no. of poles of generator of which RPM is to be measured. The value must be between 2 and 40 and a multiple of 2.
46019	RS485 Set-up Code	This address is used to set the baud rate, Parity and Number of stop bits. Refer to **TABLE 5** for details.
46021	Node Address	This register address is used to set Device address between 1 and 247 .
46023	Pulse Divisor	This address is used to set **pulse divisor** of the Pulse output. Write one of the following values to this address **for Wh**: **1** : Divisor 1 **10** : Divisor 10 **100** : Divisor 100 **1000** : Divisor 1000 & In **kWh** or **MWh** divisor will be **1 default.**
46027	Display energy	This address is used to set energy in terms of Auto ranging and Fixed Mega Unit on the display. Write one of the following values to this address: **0 :** Energy in Fixed Mega Unit **(MWh)** **1 :** Auto range unit ,where energy value is converted from **Wh** to **KWh** and **KWh** to **MWh** unit automatically. and **Default value is 1**.
46029	Analog Out 1-Para Set	This address is used to set the parameter for Analog Output 1. Refer **TABLE 9** for the available Analog Parameters.
46031	Analog Out 2-Para Set	This address is used to set the parameter for Analog Output 2. Refer **TABLE 9** for the available Analog Parameters.

Address	Parameter	Description
46033	PT Primary	This address allows the user to set PT Primary value (in terms of VL-L). The settable range is 100 VL-L to 765 kVL-L for all system types & also depends on the per phase 2544.11 MVA Restriction of power combined with CT primary.
46035	CT Pimary	This address allows the user to set CT Primary value. The settable range is 1 to 9999. It also depends on the per phase 2544.11 MVA Restriction of power combined with PT primary.
46039	Energy Digit Reset Count	This address is used to set Energy Digit Reset Count value. Energy count can be configured to reset in between 7 to 9.
46041	Word Order	Word Order controls the order in which Multifunction Meter receives or sends floating - point numbers:- normal or reversed register order . In normal mode, the two registers that make up a floating point numbers are sent most significant bytes first. In reversed register mode , the two registers that make up a floating point numbers are sent least significant bytes first. To set the mode, write the value '2141.0' into this register-the instrument will detect the order used to send this value and set that order for all ModBus transaction involving floating point numbers.
46043	CT secondary	This address is used to read and write the CT secondary value. Write one of the following values to this address. **1:** 1A CT secondary **5:** 5A CT secondary Note: For External CT model CT Secondary is not settable from modbus.
46045	PT secondary	This address is used to read and write the PT secondary value. The settable range is 100-600VLL.
46047	Relay 1 output select	This address is used to select the Relay operation as Pulse/Timer/RTC Relay/Limit. Write one of the following values to this address. **0:** Pulse output on Relay **10** (Decimal): Timer mode for Relay **40**[#] (Decimal): RTC mode for Relay. **128**[#] (Decimal)**:** Limit output on Relay.
46049	Relay 1 Para select/ No. of Cycles/ Weekly repeat	This address is used to assign the Parameter to Relay. Pulse relay: Refer **TABLE 6** Timer relay: Refer **TABLE 7** RTC relay[#]: Refer **TABLE 8** Limit relay[#]: Refer **TABLE 9**
46051	Limit 1 Trip Point	This address is used to set the trip point in %. Any value between 10 to 100 for Lo- alarm & 10 to120 for Hi-alarm can be written to this address. For energy[#] parameters, the valid range is 10-9999999. (refer **TABLE 9**).

Address	Parameter	Description
46053	Limit 1 Hysteresis	This address is used to set the hysteresis between 0.5 to 50.0%.
46055	Relay 1 On (Energize) Delay/ On Time	This address is used to set the Energizing delay or On delay in seconds in range of 1 to 9999. For RTC Relay this range is 00.00 to 23.59.
46057	Relay 1 Off (De-Energize) Delay/ Off Time	This address is used to set the De-energizing delay or Off delay in seconds in range of 1 to 9999. For RTC Relay this range is 00.00 to 23.59.
46059	Relay 2 output select	Same as Relay 1.
46061	Relay 2 Para select/ No. of Cycles/ Weekly repeat	
46063	Limit 2 Trip Point	
46065	Limit 2 Hysteresis	
46067	Relay 2 On (Energize) Delay/ On Time	
46069	Relay 2 Off (De-Energize) Delay/ Off Time	
46071	Password	This address is used to set & reset the password. Valid Range of Password can be set is 0000 - 9999 . 1) If password lock is present & if this location is read it will return **zero**. 2) If Password lock is absent & if this location is read it will return **One**. 3) If password lock is present & to disable this lock first send valid password to this location then write “0000” to this location 4) If password lock is present & to modify 4X parameter first send valid password to this location so that 4X parameter will be accessible for modification. 5) If for in any of the above case invalid password is send then meter will return exceptional error 2.

Address	Parameter	Description
46073	Relay 1 Configuration Select	This address is used to set the Configuration for Relay 1 Refer **TABLE 10**.
46075	Limit 2 Configuration Select	This address is used to set the Configuration for Relay 2 Refer **TABLE 10**.
46077	Auto scroll	This address is used to activate or de-activate the auto scrolling. Write **0:** Deactivate **1:** Activate
46079	30mA Noise current Elimination	This address is used to activate or de-activate the 30 mA noise current elimination write **0:** Deactivate **30** (Decimal)**:** Activate
46081	Energy Update Rate	This address is used to specify update rate of energy in corresponding 3X registers. The valid values for update rate are from 1 to 60 min.
46083	Factory Reset	This address allows the user to reset the instrument to factory settings. Refer the **Default Values** in **TABLE 4** for factory settings. Write **5555** at this address to reset the instrument.
46087	System Frequency Selection	This address is used to set the frequency of the input. Write **50:** For 50 Hz input **60:** For 60Hz input
46089	Impulse Selection	This address is used to select the energy to which impulse is to be assigned. Writing any other value will return an error. **0:** None **1:** Active Energy **2:** Reactive Energy **3:** Apparent Energy
46091	Energy Parameter Selection	This address is used to select the parameter whose start count (initial value) is to be set. Refer **TABLE 11**.
46093	Energy Start Count	This address is used to set the start count of the parameter selected in address 46091. The start count of the parameter should be in the range specified in **TABLE 11**.
46095	Timer 1 Start/ Stop[#]	This address is used to start/stop the timer for Relay 1 in timer mode with following options: **0**: Stop **1**: Start

Address	Parameter	Description
46097	Timer 2 Start/ Stop#	This address is used to start/stop the timer for Relay 2 in timer mode with following options: **0**: Stop **1**: Start
46099	Model Number	This address is read only and displays the model number of the meter: 2017 : RM3440i 2018 : RM3440iDL
46127	RTC Complete Date#	This address is used to read and write full date in “ddmmyy” format from RTC.
46129	RTC Complete Time#	This address is used to read and write complete time in “hh.mm.ss” format from RTC.
46131	RTC Day of week#	This address is used to read the day of the week for the present date with following values: **1**:Sunday **2**:Monday **3**:Tuesday **4**:Wednesday **5**:Thursday **6**:Friday **7**:Saturday
46133	Brightness	This address allows to read or set the value of brightness of display LCD. The vaild range is from 2 to 85. Default value is 42.
46135	Contrast	This address allows to read or set the value of contrast of display LCD. The valid range is from 6 to 23,Default value is 9.
46137 to 46157	—---	—---
46159 to 46175	RGB Color Code for L1, L2, L3	This addresses allow to read or set the value of Red, Green, Blue component of color used to display phase 1, phase 2, phase 3 parameters respectively. Default value for phase 1:160, 82, 45; phase 2 : 0, 0, 0 and phase 3 : 128, 128, 128. The valid range is 0 to 255.
46181	Version Number	This address is read only and displays the version number of the meter.
46185	Event Based Datalog Select#	This register is used to enable or disable event based datalogging. 0: Disabled 1: Enabled
46187	Time Based Datalog Select#	This register is used to enable or disable time based datalogging. 0: Disabled 1: Enabled

Address	Parameter	Description
46189	Time Based Datalog Interval Selection#	This address is used to read and write the interval between consecutive time log entries in minutes. Valid value range 1-60
46191	Logging Parameter Count#	This value decides the number of parameters to be logged in time based datalogging. The value ranges from **1 to 30**.
46193-46251	Datalog Parameter 1 to 30#	These addresses are used to read and write the parameters to be logged in time based logging. For valid values, refer **TABLE 13**.
46253	Load Profile Datalog Select#	The address is used to start/stop Load Profile Datalogging. **1**: Start Load Profile datalogging **0**: Stop Load Profile datalogging
46255	Start Date of Load Profile Datalog#	This value show the starting date for Load Profile datalog. This address are read only.
46315	Sag Threshold#	The value decides the threshold for sag detection. Valid range is 10-90%.
46317	Swell Threshold#	The value decides the threshold for swell detection. Valid range is 110-150%.
46319	Sag & Swell Hysteresis#	The value decides the hysteresis for sag & swell detection. Valid range is 1-20%.
46321	Overcurrent Threshold#	The value decides the threshold for overcurrent detection. Valid range is 110-150%.
46323	Overcurrent Hysteresis#	The value decides the hysteresis for overcurrent detection. Valid range is 1-20%.
46357	IP Address	These address is used to set IP address for Ethernet.
46359	Subnet Mask	This address is used to Set subnet mask for Ethernet.
46361	Default gateway	This address is used to Set default gateway for Ethernet.
46363	Server Port	This address is used to set server port .

NOTE:

(1) Changing system type and PT/CT ratio will reset the energy.

(2) Description options/ Parameters marked # are available for RM3440iDL only and not for RM3440i.

TABLE 5 : RS 485 Set-up Code

Baud Rate	Parity	Stop Bit	Decimal value
4800	NONE	01	0
4800	NONE	02	1
4800	EVEN	01	2
4800	ODD	01	3
9600	NONE	01	4
9600	NONE	02	5
9600	EVEN	01	6
9600	ODD	01	7
19200	NONE	01	8
19200	NONE	02	9
19200	EVEN	01	10
19200	ODD	01	11
38400	NONE	01	12
38400	NONE	02	13
38400	EVEN	01	14
38400	ODD	01	15
57600	NONE	01	16
57600	NONE	02	17
57600	EVEN	01	18
57600	ODD	01	19

NOTE : Codes not listed in the table above may give rise to unpredictable results including loss of communication. Exercise caution when attempting to change mode via direct Modbus writes.

TABLE 6 : Pulse Configuration select

Code	Configuration
0	Active Energy Import
1	Active Energy Export
2	Capacitive Reactive Energy
3	Inductive Reactive Energy
4	Apparent Energy

TABLE 7 : Number of Cycles for Timer Relay

Code	Description
0	Unlimited
1 to 9999	Fixed Cycles

TABLE 8: Weekly Repeat for RTC Relay

Code	Description
1XXXXXXX E{1,2,3,4,5,6,7}	Eg 11010000 means relay will operate only on Sun & Tue.' E'bit indicate Enable/Disable
	1 = Sunday, 7 = Saturday

TABLE 9 : Parameter for Analog & Limit Output

Para. No	Parameter	3P 4W	3P 3W	1P 2W	Analog output	Trip Point Set Range	100% Value
0	None	✓	✓	✓	-	-	-
1	Volts 1	✓	✓	✓	0 - 100 %	10 - 120 %	Vnom (L-N)
2	Volts 2	✓	✓	✘	0 - 100 %	10 - 120 %	Vnom (L-N)
3	Volts 3	✓	✓	✘	0 - 100 %	10 - 120 %	Vnom (L-N)
4	IL1	✓	✓	✓	0 - 100 %	10 - 120 %	Inom
5	IL2	✓	✓	✘	0 - 100 %	10 - 120 %	Inom
6	IL3	✓	✓	✘	0 - 100 %	10 - 120 %	Inom
7	W1	✓	✘	✓	0 - 120 %	10 - 120 %	Nom (3)
8	W2	✓	✘	✘	0 - 120 %	10 - 120 %	Nom (3)
9	W3	✓	✘	✘	0 - 120 %	10 - 120 %	Nom (3)
10	Va1	✓	✘	✓	0 - 120 %	10 - 120 %	Nom (3)
11	Va2	✓	✘	✘	0 - 120 %	10 - 120 %	Nom (3)
12	Va3	✓	✘	✘	0 - 120 %	10 - 120 %	Nom (3)
13	Var1	✓	✘	✓	0 - 120 %	10 - 120 %	Nom (3)
14	Var2	✓	✘	✘	0 - 120 %	10 - 120 %	Nom (3)
15	VAr3	✓	✘	✘	0 - 120 %	10 - 120 %	Nom (3)
16	PF1 #	✓	✘	✓	180° / 0 / -180°	10 - 90 %	90°
17	PF2 #	✓	✘	✘	180° / 0 / -180°	10 - 90 %	90°
18	PF3 #	✓	✘	✘	180° / 0 / -180°	10 - 90 %	90°
19	PA1 #	✓	✘	✓	-	10 - 90 %	360°
20	PA2 #	✓	✘	✘	-	10 - 90 %	360°
21	PA3 #	✓	✘	✘	-	10 - 90 %	360°
22	Volts Ave	✓	✓	✘	0 - 100 %	10 - 120 %	Vnom (2)
24	Current Ave	✓	✓	✘	0 - 100 %	10 - 120 %	Inom
27	Watts sum	✓	✓	✘	0 - 120 %	10 - 120 %	Nom (3)
29	VA sum	✓	✓	✘	0 - 120 %	10 - 120 %	Nom (3)
31	VAr sum	✓	✓	✘	0 - 120 %	10 - 120 %	Nom (3)
32	PF Ave. #	✓	✓	✘	180° / 0 / -180°	10 - 90 %	90°
34	PA Ave. #	✓	✓	✘	180° / 0 / -180°	10 - 90 %	360°
36	Freq. #	✓	✓	✓	45 to 65 Hz	10 - 90 %	66 Hz (1)
37	Wh Import*	✓	✓	✓	-	10 - 9999999	Nom (3)

TABLE 9 : Continued...

Para No.	Parameter	3P 4W	3P 3W	1P 2W	Analog output	Trip Point Set Range	100% Value
38	Wh Export*	✓	✓	✓	-	10 - 9999999	Nom (3)
39	VArh Capacitive*	✓	✓	✓	-	10 - 9999999	Nom (3)
40	VArh Inductive *	✓	✓	✓	-	10 - 9999999	Nom (3)
41	VAh*	✓	✓	✓	-	10 - 9999999	Nom (3)
43	Watt Demand Imp.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
44	Watt Max Demand Imp.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
45	Watt Demand Exp.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
46	Watt Demand Max Exp.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
47	VAr Demand Cap.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
48	VAr Max Demand Cap.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
49	VAr Demand Ind.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
50	VAr Demand Max Ind.	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
51	VA Demand	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
52	VA Max Demand	✓	✓	✓	0 - 120 %	10 - 120 %	Nom (3)
53	Current Demand	✓	✓	✓	0 - 100 %	10 - 120 %	Inom
54	Current Max Demand	✓	✓	✓	0 - 100 %	10 - 120 %	Inom
101	VL1-L2	✓	✗	✗	0 - 100 %	10 - 120 %	Vnom (L-L)
102	VL2-L3	✓	✗	✗	0 - 100 %	10 - 120 %	Vnom (L-L)
103	VL3-L1	✓	✗	✗	0 - 100 %	10 - 120 %	Vnom (L-L)
113	I Neutral	✓	✗	✗	0 - 100 %	10 - 120 %	Inom
114	Relay Manual OFF*	✓	✓	✓	-	1	-
115	Relay Manual ON*	✓	✓	✓	-	1	-

Note : Parameters 1,2,3 are L-N Voltage for 3P 4W & L-L Voltage for 3P 3W.

#Note : Parameters marked are not applicable for RM3440i and Analog output.

(1) For Frequency 0% corresponds to 45 Hz and 100% corresponds to 66 Hz.

(2) For 3P 4W and 1P2W the nominal value is VLN and that for 3P 3W is VLL.

(3) Nominal Value for power is calculated from Nominal Voltage and current values.

(4) Nominal Value is to be considered with set CT/ PT Primary values.

(5) For single phase L1 Phase values are to be considered as System values.

TABLE 10: Relay Configuration

For Limit Relay

Code	Configuration
0	Hi - alarm & energised Relay
1	Hi - alarm & De-energised Relay
2	Lo - alarm & Energised Relay
3	Lo - alarm & De-energised Relay

For Timer or RTC relay

Code	Configuration
0	Energize when triggered
1	De-energize when triggered

TABLE 11: Energy Parameter Selection and Start Count

Parameter Number	Parameter	Range
1	Imp Active Energy Start Count	1 to 999999999
2	Exp Active Energy Start Count	1 to 999999999
3	Capacitive Reactive Energy Start Count	1 to 999999999
4	Inductive Reactive Energy Start Count	1 to 999999999
5	Apparent Energy Start Count	1 to 999999999
7	Imp Active Energy Overflow Start Count	1 to 999999
8	Exp Active Energy Overflow Start Count	1 to 999999
9	Capacitive Reactive Energy Overflow Start Count	1 to 999999
10	Inductive Reactive Energy Overflow Start Count	1 to 999999
11	Apparant Energy Overflow Start Count	1 to 999999

TABLE 12 : Measurement Parameters for both models

Measured Parameters	Units of Measurement	RM3440i	RM3440iDL
System Voltage	Volts	✓	✓
System Current	Amps	✓	✓
Voltage VL1-N(4wire only)	Volts	✓	✓
Voltage VL2-N(4wire only)	Volts	✓	✓
Voltage VL3-N(4wire only)	Volts	✓	✓
Voltage VL1-L2 (for 3 / 4 wire)	Volts	✓	✓
Voltage VL2-L3 (for 3 / 4 wire)	Volts	✓	✓
Voltage VL3-L1 (for 3 / 4 wire)	Volts	✓	✓
Current L1(for 3 / 4 wire)	Amps	✓	✓
Current L2(for 3 / 4 wire)	Amps	✓	✓
Current L3(for 3 / 4 wire)	Amps	✓	✓
Neutral Current (4 wire only)	Amps	✓	✓
Frequency	Hz	✓	✓
Active Power (System / Phase (4 wire only))	Kwatts	✓	✓
Reactive Power (System / Phase (4 wire only))	KVAr	✓	✓
Apparent Power (System / Phase (4 wire only))	KVA	✓	✓
Power Factor (System / Phase (4 wire only))	——	✓	✓
Phase Angle (Phase(4 wire only))	Degree	✓	✓
Active Import Energy (8 Digit resolution)	kWh	✓	✓
Active Export Energy (8 Digit resolution)	kWh	✓	✓
Inductive Reactive Energy (8 Digit resolution)	kVArh	✓	✓
Capacitive Reactive Energy (8 Digit resolution)	kVArh	✓	✓
Apparent Energy (8 Digit resolution)	kVAh	✓	✓
RTC	Date,Time	✗	✓
Individual Harmonics V	%	✗	✓
Individual Harmonics I	%	✗	✓
Sag, Swell & Overcurrent Events	-	✗	✓

TABLE 12 : Continued...

Measured Parameters	Units of Measurement	RM3440i	RM3440iDL
Timer1 No. of Cycles, ON, OFF delay	count,sec,sec	✗	✓
Timer2 No. of Cycles, ON, OFF delay	count,sec,sec	✗	✓
Current Demand	Amps	✓	✓
KVA Demand	KVA	✓	✓
KW Import Demand	KW	✓	✓
KW Export Demand	KW	✓	✓
KVAr Cap. Demand	KW	✓	✓
KVAr Ind. Demand	KW	✓	✓
Max Current Demand	Amps	✓	✓
Max kVA Demand	KVA	✓	✓
Max KW Import Demand	KW	✓	✓
Max KW Export Demand	KW	✓	✓
Max KVAr Ind. Demand	KW	✓	✓
Max KVAr Cap. Demand	KW	✓	✓
Run Hour	Hours	✓	✓
On Hour	Hours	✓	✓
Number of Interruptions	Counts	✓	✓
Phase Reversal Indication (4 wire only)	——	✓	✓
V1 THD* (for 3 / 4 wire)	%	✓	✓
V2 THD* (for 3 / 4 wire)	%	✓	✓
V3 THD* (for 3 / 4 wire)	%	✓	✓
I1 THD (for 3 / 4 wire)	%	✓	✓
I2 THD (for 3 / 4 wire)	%	✓	✓
I3 THD (for 3 / 4 wire)	%	✓	✓
System Voltage THD	%	✓	✓
System Current THD	%	✓	✓

***Note : THD Parameters are L-N in case of 3P 4W & L-L in case of 3P 3W .**

TABLE 13 : Datalogging Parameters List

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
0	V1	✓	✓	✓
1	V2	✓	✓	✗
2	V3	✓	✓	✗
3	I1	✓	✓	✓
4	I2	✓	✓	✗
5	I3	✓	✓	✗
6	W1	✓	✗	✓
7	W2	✓	✗	✗
8	W3	✓	✗	✗
9	VA1	✓	✗	✓
10	VA2	✓	✗	✗
11	VA3	✓	✗	✗
12	VAR1	✓	✗	✓
13	VAR2	✓	✗	✗
14	VAR3	✓	✗	✗
15	PF1	✓	✗	✓
16	PF2	✓	✗	✗
17	PF3	✓	✗	✗
18	Angle1	✓	✗	✓
19	Angle2	✓	✗	✗
20	Angle3	✓	✗	✗
21	Volt Avg	✓	✓	✗
22	Volt Sum	✓	✓	✗
23	Current Avg	✓	✓	✗
24	Current Sum	✓	✓	✗
25	Watt Avg	✓	✓	✗
26	Watt Sum	✓	✓	✗
27	VA Avg	✓	✓	✗
28	VA Sum	✓	✓	✗
29	VAR Avg	✓	✓	✗

TABLE 13 : Continued...

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
30	VAR Sum	✓	✓	✗
31	PF Avg	✓	✓	✗
32	PF Sum	✓	✗	✗
33	Phase Angle Avg	✓	✓	✗
34	Phase Angle Sum	✓	✓	✗
35	Freq	✓	✓	✓
36	Wh import	✓	✓	✓
37	Wh export	✓	✓	✓
38	VARh Capacitive	✓	✓	✓
39	VARh Inductive	✓	✓	✓
40	VAh	✓	✓	✓
42	kw imp demand	✓	✓	✓
43	max kW imp demand	✓	✓	✓
44	kW exp demand	✓	✓	✓
45	max kW exp demand	✓	✓	✓
46	kVAr Cap. demand	✓	✓	✓
47	max kVAr Cap. demand	✓	✓	✓
48	kVAr Ind. demand	✓	✓	✓
49	max kVAr Ind. demand	✓	✓	✓
50	KVA demand	✓	✓	✓
51	max KVA demand	✓	✓	✓
52	current demand	✓	✓	✓
53	max current demand	✓	✓	✓
54	Wh Import Overflow Count	✓	✓	✓
56	Wh Export Overflow Count	✓	✓	✓
58	VARh Capacitive OF Count	✓	✓	✓
60	VARh Inductive OF Count	✓	✓	✓
62	Vah Overflow Count	✓	✓	✓
66	system voltage max	✓	✓	✓
67	system voltage min	✓	✓	✓

TABLE 13 : Continued...

Para. No.	Parameter	3P 4W	3P 3W	1P 2W
68	RPM	✓	✓	✓
70	system current max	✓	✓	✓
71	system current min	✓	✓	✓
100	V12	✓	✗	✗
101	V23	✓	✗	✗
102	V31	✓	✗	✗
103	V THD-L1	✓	✓	✓
104	V THD-L2	✓	✓	✗
105	V THD-L3	✓	✓	✗
106	I THD-L1	✓	✓	✓
107	I THD-L2	✓	✓	✗
108	I THD-L3	✓	✓	✗
109	System V-THD	✓	✓	✓
110	System I-THD	✓	✓	✓
112	Neutral Current	✓	✗	✗
113	Run hour	✓	✓	✓
114	On Hour	✓	✓	✓
115	No. of interrupts	✓	✓	✓
166	Phase indicate	✓	✓	✗

3.5 User Assignable Modbus Registers:

The Multifunction Instrument contains 20 user assignable registers in the address range of 0x400 (31025) to 0x426 (31065) for 3X registers (**see TABLE 14**) and address range of 0x400 (41025) to 0x426 (41065) for 4X registers (**see TABLE 14**).

Any of the parameter addresses (3X register addresses and 4X register addresses **TABLE 1**) accessible in the instrument can be mapped to these 20 user assignable registers.

Parameters (3X and 4X registers addresses) that reside in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.

The actual address of the parameters (3X and 4X registers addresses) which are to be accessed via address 0x400 to 0x426 are specified in 4X Register 0x251C to 0x252F (**see TABLE 15**).

TABLE 14 : User Assignable 3X Data Registers

Address (3X)	Address (4X)	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
31025	41025	Assignable Reg 1	04	00
31027	41027	Assignable Reg 2	04	02
31029	41029	Assignable Reg 3	04	04
31031	41031	Assignable Reg 4	04	06
31033	41033	Assignable Reg 5	04	08
31035	41035	Assignable Reg 6	04	0A
31037	41037	Assignable Reg 7	04	0C
31039	41039	Assignable Reg 8	04	0E
31041	41041	Assignable Reg 9	04	10
31043	41043	Assignable Reg 10	04	12
31045	41045	Assignable Reg 11	04	14
31047	41047	Assignable Reg 12	04	16
31049	41049	Assignable Reg 13	04	18
31051	41051	Assignable Reg 14	04	1A
31053	41053	Assignable Reg 15	04	1C
31055	41055	Assignable Reg 16	04	1E
31057	41057	Assignable Reg 17	04	20
31059	41059	Assignable Reg 18	04	22
31061	41061	Assignable Reg 19	04	24
31063	41063	Assignable Reg 20	04	26

TABLE 15 : User Assignable mapping register (4X registers)

Address (4X)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
49501	Mapped Add for register #0x0400	25	1C
49502	Mapped Add for register #0x0402	25	1D
49503	Mapped Add for register #0x0404	25	1E
49504	Mapped Add for register #0x0406	25	1F
49505	Mapped Add for register #0x0408	25	20
49506	Mapped Add for register #0x040A	25	21
49507	Mapped Add for register #0x040C	25	22
49508	Mapped Add for register #0x040E	25	23
49509	Mapped Add for register #0x0410	25	24

TABLE 15 : Continued...

Address (4X)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
49510	Mapped Add for register #0x0412	25	25
49511	Mapped Add for register #0x0414	25	26
49512	Mapped Add for register #0x0416	25	27
49513	Mapped Add for register #0x0418	25	28
49514	Mapped Add for register #0x041A	25	29
49515	Mapped Add for register #0x041C	25	2A
49516	Mapped Add for register #0x041E	25	2B
49517	Mapped Add for register #0x0420	25	2C
49518	Mapped Add for register #0x0422	25	2D
49519	Mapped Add for register #0x0424	25	2E
49520	Mapped Add for register #0x0426	25	2F

Assigning parameter to User Assignable Registers:

To access the Voltage2 (3X address 0x0002) and Power Factor1 (3X address 0x001E) through user assignable register assign these addresses to 4x register (**TABLE 15**) 0x251C and 0x251D respectively.

Assigning Query:

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	25 (Hex)
Starting Address Lo	1C (Hex)
Number of Registers Hi	00 (Hex)*
Number of Registers Lo	02(Hex)*
Byte Count	04 (Hex)
Data Register-1High Byte	00 (Hex)
Data Register-1 Low Byte	02 (Hex)
Data Register-2 High Byte	00 (Hex)
Data Register-2 Low Byte	1E (Hex)
CRC Low	CB (Hex)
CRC High	07 (Hex)

} Voltage 2 * (3X Address 0x0002)

} Power Factor 1 *(3X Address 0x001E)

Response :

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	25 (Hex)
Start Address Low	1C (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	40 (Hex)
CRC High	70 (Hex)

* Note : Parameters should be assigned in Multiple of two i.e. 2,4,6,8.....20.

Reading Parameter data through User Assignable Registers:
In assigning query Voltage 2 & Power Factor 1 parameters were assigned to 0x251C & 0x251D (**TABLE 15**) which will point to user assignable 3x registers 0x400 and 0x402 (**TABLE 14**). So to read Voltage2 and Power Factor1 data reading query should be as below.

Query:

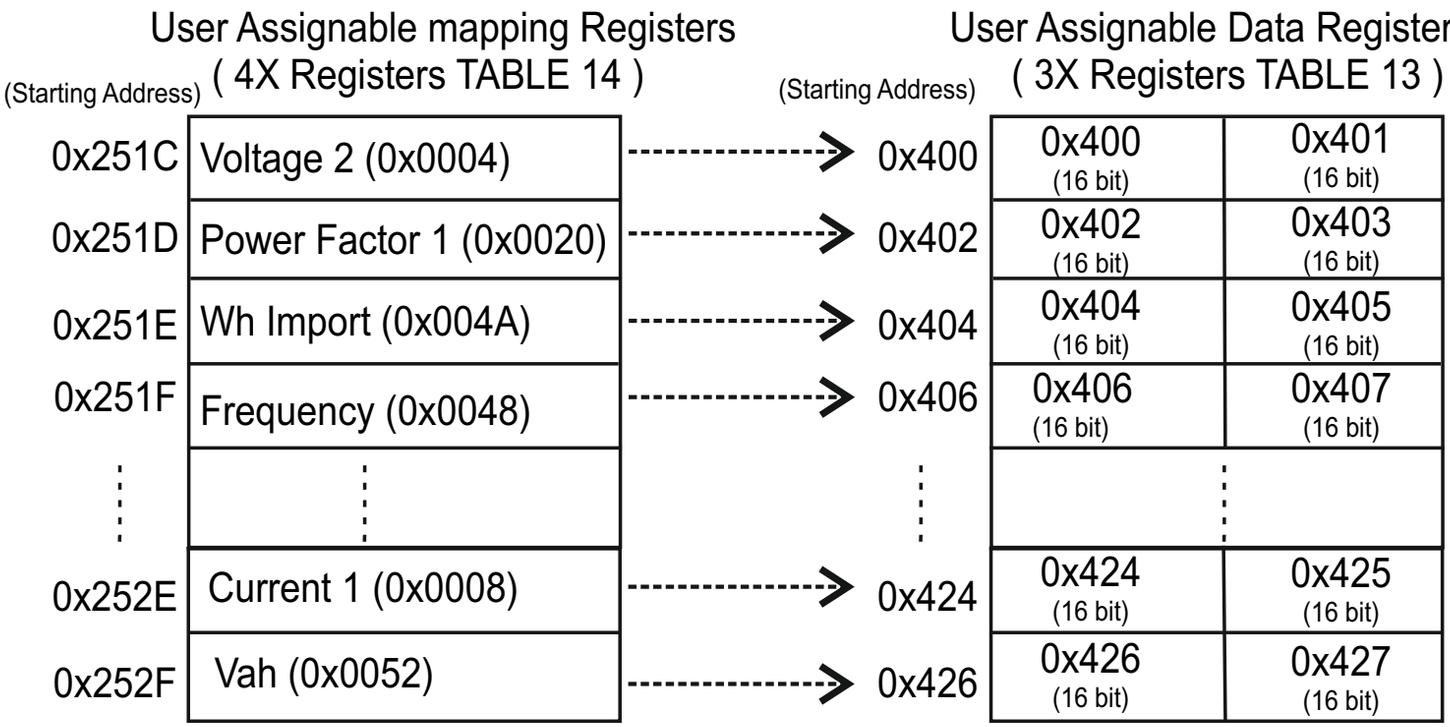
Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	04(Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	04 (Hex)**
CRC Low	F0 (Hex)
CRC High	71 (Hex)

Start Address High : Most significant 8 bits of starting address of Userassignable register.
Start Address low :Least significant 8 bits of starting address of User assignable register.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.

Response : (Volt2 = 219.30 / Power Factor1 = 1.0)

Device Address	01 (Hex)	
Function Code	04 (Hex)	
Byte count	08 (Hex)	
Data Register-1High Byte	43 (Hex)	**Voltage 2 Data**
Data Register-1 Low Byte	5B (Hex)	
Data Register-2 High Byte	4E (Hex)	
Data Register-2 Low Byte	04 (Hex)	
Data Register-3 High Byte	3F (Hex)	**Power Factor 1 Data**
Data Register-3 Low Byte	80 (Hex)	
Data Register-4 High Byte	00 (Hex)	
Data Register-4 Low Byte	00 (Hex)	
CRC Low	79 (Hex)	
CRC High	3F (Hex)	

****Note : Two consecutive 16 bit register represent one parameter. Since two parameters are requested**



To get the data through User Assignable Register go through the following steps:

1) Assign starting addresses(**TABLE 1**) of parameters of interest to "User assignable mapping registers" in a sequence in which they are to be accessed (see Section "**Assigning Parameter to User Assignable Registers"** of Section 3.4).
2) Once the parameters are mapped, data can be acquired by using "User assignable data register" Starting address . i.e to access data of Voltage2, Power factor1,Wh import, Frequency send query with starting address 0x0400 with number of register 8 or individually parameters can be accessed. For example, if current1 is to be accessed use starting address 0x0424. (see Section **Reading Parameter data through User Assignable Registers** of Section 3.4)**.**

4. Datalogging

Datalogging is a feature that allows the meter to store measured parameters based on time or on occurrence of a certain event. The user can retrieve the data later for further application.

This meter offers three types of datalogging

1) Event based 2) Time based 3) Load profile

4.1 Event Based Datalogging

This type of datalogging stores data when certain event is observed. This data is time stamped and last five occurrences of each type of event are stored based on first in first out queue. This meter offers event based logging for 10 parameters. This data can be observed on the modbus on the address table shown below. These registers can be accessed by the query explained in section 3.1 The user can turn this logging on and off through display as well as modbus by using address 46185.

Changing any setup parameter related to the logged parameters will reset the log.

Note: Below addresses are available for 3X and for 4X.

for example 312289 for 3X and 412289 for 4X.

Table 16: Addresses for event based datalog

Address	Logged Parameter	Log Details	Mod Start Address Hex	
			High Byte	Low Byte
312289	Max Voltage	Date 1	30	00
312291		Time 1	30	02
312293		Value 1	30	04
312295		Date 2	30	06
312297		Time 2	30	08
312299		Value 2	30	0A
312301		Date 3	30	0C
312303		Time 3	30	0E
312305		Value 3	30	10
312307		Date 4	30	12
312309		Time 4	30	14
312311		Value 4	30	16
312313		Date 5	30	18
312315		Time 5	30	1A
312317		Value 5	30	1C

Address	Logged Parameter	Log Details	Mod Start Address Hex	
			High Byte	Low Byte
312319	Min Voltage	Date 1	30	1E
312321		Time 1	30	20
312323		Value 1	30	22
312325		Date 2	30	24
312327		Time 2	30	26
312329		Value 2	30	28
312331		Date 3	30	2A
312333		Time 3	30	2C
312335		Value 3	30	2E
312337		Date 4	30	30
312339		Time 4	30	32
312341		Value 4	30	34
312343		Date 5	30	36
312345		Time 5	30	38
312347		Value 5	30	3A

Table 16: Continued...

312349	Max Current	Date 1	30	3C
312351		Time 1	30	3E
312353		Value 1	30	40
312355		Date 2	30	42
312357		Time 2	30	44
312359		Value 2	30	46
312361		Date 3	30	48
312363		Time 3	30	4A
312365		Value 3	30	4C
312367		Date 4	30	4E
312369		Time 4	30	50
312371		Value 4	30	52
312373		Date 5	30	54
312375		Time 5	30	56
312377		Value 5	30	58
312379	Min Current	Date 1	30	5A
312381		Time 1	30	5C
312383		Value 1	30	5E
312385		Date 2	30	60
312387		Time 2	30	62
312389		Value 2	30	64
312391		Date 3	30	66
312393		Time 3	30	68
312395		Value 3	30	6A
312397		Date 4	30	6C
312399		Time 4	30	6E
312401		Value 4	30	70
312403		Date 5	30	72
312405		Time 5	30	74
312407		Value 5	30	76

312409	Max W Import Demand	Date 1	30	78
312411		Time 1	30	7A
312413		Value 1	30	7C
312415		Date 2	30	7E
312417		Time 2	30	80
312419		Value 2	30	82
312421		Date 3	30	84
312423		Time 3	30	86
312425		Value 3	30	88
312427		Date 4	30	8A
312429		Time 4	30	8C
312431		Value 4	30	8E
312433		Date 5	30	90
312435		Time 5	30	92
312437		Value 5	30	94
312439	Max W Export Demand	Date 1	30	96
312441		Time 1	30	98
312443		Value 1	30	9A
312445		Date 2	30	9C
312447		Time 2	30	9E
312449		Value 2	30	A0
312451		Date 3	30	A2
312453		Time 3	30	A4
312455		Value 3	30	A6
312457		Date 4	30	A8
312459		Time 4	30	AA
312461		Value 4	30	AC
312463		Date 5	30	AE
312465		Time 5	30	B0
312467		Value 5	30	B2

Table 16: Continued...

312469	Max VAr Capacitive Demand	Date 1	30	B4
312471		Time 1	30	B6
312473		Value 1	30	B8
312475		Date 2	30	BA
312477		Time 2	30	BC
312479		Value 2	30	BE
312481		Date 3	30	C0
312483		Time 3	30	C2
312485		Value 3	30	C4
312487		Date 4	30	C6
312489		Time 4	30	C8
312491		Value 4	30	CA
312493		Date 5	30	CC
312495		Time 5	30	CE
312497		Value 5	30	D0
312499	Max VAr Inductive Demand	Date 1	30	D2
312501		Time 1	30	D4
312503		Value 1	30	D6
312505		Date 2	30	D8
312507		Time 2	30	DA
312509		Value 2	30	DC
312511		Date 3	30	DE
312513		Time 3	30	E0
312515		Value 3	30	E2
312517		Date 4	30	E4
312519		Time 4	30	E6
312521		Value 4	30	E8
312523		Date 5	30	EA
312525		Time 5	30	EC
312527		Value 5	30	EE

312529	Max VA Demand	Date 1	30	F0
312531		Time 1	30	F2
312533		Value 1	30	F4
312535		Date 2	30	F6
312537		Time 2	30	F8
312539		Value 2	30	FA
312541		Date 3	30	FC
312543		Time 3	30	FE
312545		Value 3	31	0
312547		Date 4	31	2
312549		Time 4	31	4
312551		Value 4	31	6
312553		Date 5	31	8
312555		Time 5	31	0A
312557		Value 5	31	0C
312559	Max A Demand	Date 1	31	0E
312561		Time 1	31	10
312563		Value 1	31	12
312565		Date 2	31	14
312567		Time 2	31	16
312569		Value 2	31	18
312571		Date 3	31	1A
312573		Time 3	31	1C
312575		Value 3	31	1E
312577		Date 4	31	20
312579		Time 4	31	22
312581		Value 4	31	24
312583		Date 5	31	26
312585		Time 5	31	28
312587		Value 5	31	2A

4.2 Time Based Datalogging

This type of datalogging stores data with a timestamp at a preset time interval. This can be used to take a snapshot of the system at regular time intervals. This data can be used to do in-depth analysis of the system. The number of parameters to be logged and which parameters to store can also be configured by the user through display as well as modbus. Various configuration registers can be found on addresses 46187 to 46251.
The number of entries stored varies according to the number of parameters logged i.e. more entries can be stored if less number of parameters are being logged. User can configure the meter to store 1 to 30 parameters. And the time interval can vary from 1 to 60 minutes. Editing of these parameters is not allowed while the logging is on.

Each entry consists of number of parameters selected by the user in addition to date and time of the entry log.
Max Memory Locations = 273030
Actual parameter stored in Each log = Date +time+Number of parameter selected by user

for ex. Number of parameter selected by user = 1.

Actual parameter stored in Each log = 1(Date) +1(time)+ 1 = 3

Maximum log that can be stored = Max Memory Location/Actual parameter stored in Each log
=273030/3= 91010

Timelog Interval setting = 15 minutes

Log in one day = (60 /Timelog Interval setting) * 24
=(60/15)*24 = 96

Max Days = Maximum log that can be stored / log in one day
= 91010 / 96 = 948.20 days

After all memory allocated locations are filled with logging data, the meter will start shifting data by first in first out queue i.e. at any time after all the locations are used once, the user will have access to the latest logged maximum number of entries.

Query Format for Downloading the Time based datalog

The query format for downloading an entry of a time datalog is given below. Maximum number of register the user can access in 1 query are limited by 64 and corresponding to it maximum byte count is 128. The byte count should be logging parameter count multiplied by 4 and added to 8, where 8 is the byte count for date and time (4 bytes x 2 parameters).

(logging parameter count x 4) + (2 x 4)
e.g.
if logging parameter count is 10

byte count = (10 x 4) + 8 = 48 (4 bytes per parameter)

number of registers = (10 x 2) + (2 x 2) = 24 (2 registers per parameter)

Starting address will be 01,CA for time datalog.
The entry number of the desired log need to be converted to IEEE format and sent as 4 bytes.

Query example:

Description	Decimal Value	Hex Value
Dev Addr	3	03
Func Code	16	10
Start Addr Hi		01
Start Addr Lo		CA
No of Reg Hi	00	00
No of Reg Lo	14	0E
Log Download Bytes	28	1C
Entry No Reg 1 Hi	25	41
Entry No Reg 1 Lo		C8
Entry No Reg 2 Hi		00
Entry No Reg 2 Lo		00
CRC Lo		CC
CRC Hi		A4

If a user wants to download 5 parameters logged at entry number 25, the query will be as following (Assuming device address 3). All the data in query is represented in hexadecimal float.

03,10, 01, CA,00,0E,1C,41,C8,00,00,CC,A4

03 is device address;
10 is function code;
01 CA is the address that lets the user access the time datalog;
00 0E is number of registers to be accessed (actual parameter count x 2+4);
1C is number of bytes to be accessed;
41 C8 00 00 is entry number converted to hex;
CC A4 is CRC calculated on query.

Response:

Description	Hex Value	Decimal Value
Dev Addr	03	03
Func Code	10	16
No of bytes	1C	28
Date	46,24,28,00	010506(May 1st 2006)
Time	40,CC,CC,CD	6.40 (06:40 am)
Parameter 1	41,78,1F,68	15.50
Parameter 2	46,AB,5A,12	21933.0
Parameter 3	46,AC,57,6A	22059.7
Parameter 4	46,AB,3C,58	21918.2
Parameter 5	46,A9,AD,9D	21718.8
CRC	BE,7C	

The response to time datalog query contains data in following structure.

First two bytes are device address and function code, followed by number of bytes data of 1 byte and then date and a time data of 4 bytes each.

Then requested parameters are received in order that is specified in timelog parameters settings, each of 4 bytes.

The response ends with 2 bytes of CRC.

4.3 Load Profile Datalogging

This type of datalogging stores data on each day at time 00:00. The parameters stored in this log include all energies and maximum demands. This log stores data daily as well as monthly interval. Hence, daily and monthly energy consumption can be logged. Furthermore, maximum power demand and maximum current demand during each day and each month is also logged . This data can be used to study load behaviour over a period of time.

The daily data available to the user is maximum of one year interval and the monthly data for 14 years interval assuming the log requested is after the starting date (requesting data before the starting date will result in modbus exception message). 1 year after the starting date, the oldest logs of daily data are constantly replaced with latest logs. 14 years after the starting date, all the load profile logs for that channel are cleared and logging is started again.

This log can be selected or de-selected using memory location 46253, if it is selected, then energy, maximum demand will be logged. The starting date of this datalog is stored in read only memory location 46255.

The user can access different parameters in this log by sending queries using following addresses.

Note: Changing the meter date resets the load profile log.

TABLE 17: Addresses for Load Profile datalog access

Parameter	Modbus Start Address Hex	
	High Byte	Low Byte
Daily Energy Datalog Download Addr	01	CC
Daily Maximum Demand Datalog Download Addr	01	CE
Monthly Energy Overflow count Datalog Download Addr	01	D0
Monthly Energy Datalog Download Addr	01	D2
Monthly Maximum Demand Datalog Download Addr	01	D4

Note: Total Monthly energy is combination of overflow count and main energy .

For Example: if overflow count = 2 and main energy is 345678 then total energyfor that month will be,

2x10^9 +345678= 2000345678.

TABLE 18: Parameter number for Energy datalog Load Profile

Parameter number	Description
01	Imp watt energy
02	Exp watt energy
03	Capacitive VAr energy
04	Inductive VAr energy
05	Apparent energy

TABLE 19: Parameter number for max. Power Demand datalog Load Profile

Parameter number	Description
01	Imp watt Max demand
02	Exp watt Max demand
03	Capacitive VAr Max demand
04	Inductive VAr Max demand
05	Apparent Max demand
06	Current Max demand

TABLE 20 : Parameter number for Energy overflow datalog Load Profile

Parameter number	Description
01	Imp watt energy OF
02	Exp watt energy OF
03	Capacitive VAr energy OF
04	Inductive VAr energy OF
05	Apparent energy

Query Format for Downloading the Load Profile Datalog

The query format for downloading an entry of a daily load profile log is given below. Maximum number of register the user can access in 1 query are limited by 40.

Query example:

Description	Decimal Value	Hex Value
Dev Addr	03	03
Func Code	16	10
Start Addr Hi		01
Start Addr Lo		CC
No of Reg Hi	00	00
No of Reg Lo	20	14
Log Download Bytes	40	28
Parameter no	03	03
Date	04	04
Month	11	0B
Year	17	11
CRC Lo		AD
CRC Hi		C3

Example: If a user wants to access daily energy load profile log of Capacitive VAr Energy for 10 days from 4 November 2017 to 13 November 2017, the query for this will be as following.

03,10,01,CC,00,14,28,03,04,0B,11,AD,C3

03 is device address;
10 is function code;
01 CC is the starting address for accessing the daily energy load profile log. (refer **TABLE 17**)
00 14 is the number of registers to be accessed. This value will be double of the number of parameters requested.
28 is the number of bytes requested in this query. This value will be 4 times the number of parameters requested.
03 is the parameter number for Capacitive VAr energy import data. (refer **TABLE 18**)
04 0B 11 is the starting date of the log to be accessed.
AD C3 is the CRC added at the end.
Note: **Energy is read in integer format.**

Response:

Description	Hex	Decimal
Dev Addr	03	03
Func Code	10	16
Number of bytes	28	40
Value 1 (Nov 4)	05,59,F1,C6	89780678
Value 2 (Nov 5)	05,59,F2,40	89780800
Value 3 (Nov 6)	05,59,F3,D0	89781200
Value 4 (Nov 7)	05,59,F4,98	89781400
Value 5 (Nov 8)	05,59,F5,60	89781600
Value 6 (Nov 9)	05,59,F6,28	89781800
Value 7 (Nov 10)	05,59,F6,F0	89782000
Value 8 (Nov 11)	05,59,F7,B8	89782200
Value 9 (Nov 12)	05,59,F8,80	89782400
Value 10 (Nov 13)	05,59,F9,48	89782600
CRC	A9,2A	

The response to the load profile query contains device address, function code and number of bytes data each of 1 byte, and then the requested parameters of 4 bytes each. Each parameter represents data over a period of a day when daily log is accessed and represents data over a period of a month when monthly log is accessed.
The response ends with 2 byte CRC.

Query example:

Description	Decimal Value	Hex Value
Dev Addr	03	03
Func Code	16	10
Start Addr Hi		01
Start Addr Lo		CE
No of Reg Hi	00	00
No of Reg Lo	20	14
Log Download Bytes	40	28
Parameter no	03	03
Date	04	04
Month	11	0B
Year	17	11
CRC Lo		AD
CRC Hi		C3

Example: If a user wants to access daily energy load profile log of Capacitive VAr max demand for 10 days from 4 November 2017 to 13 November 2017, the query for this will be as following.

03,10,01,CE,00,14,28,03,04,0B,11,AD,C3,00,14,28,03,04, 0B,11,AD,C3

03 is device address;
10 is function code;
01 CE is the starting address for accessing the daily demand load profile log. (refer **TABLE 17**)
00 14 is the number of registers to be accessed. This value will be double of the number of parameters requested.
28 is the number of bytes requested in this query. This value will be 4 times the number of parameters requested.
03 is the parameter number for Capacitive Var max demand data. (refer **TABLE 18**)
04 0B 11 is the starting date of the log to be accessed.
AD C3 is the CRC added at the end.

The load profile datalog access query consists of device address and function code followed by the starting address which is different for different parameters and mentioned in **TABLE 17**. Number of registers can vary in multiple of 2, but can not exceed 40 and corresponding to it, number of bytes can not exceed 80.
Parameter number decides the parameter within the log (eg. Capacitive VAr demand from the daily demand log.) Refer **TABLE 18** and **TABLE 19**.
Date, month and year decides the date from which the data is to be downloaded.
All data in the query is represented in hexadecimal format.
At the end 2 byte CRC is calculated.

Note: **demand is read in float format.**

Response:

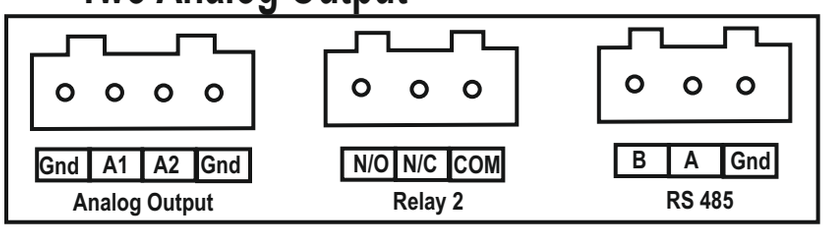
Description	Hex	Decimal
Dev Addr	03	03
Func Code	10	16
Number of bytes	28	40
Value 1 (Nov 4)	43,7A,99,99	250.6
Value 2 (Nov 5)	42,C9,66,66	100.7
Value 3 (Nov 6)	43,16,D4,7B	150.38
Value 4 (Nov 7)	44,16,39,9A	600.9
Value 5 (Nov 8)	42,97,CC,CD	75.9
Value 6 (Nov 9)	43,1C,B3,33	156.7
Value 7 (Nov 10)	43,AF,19,9A	350.2
Value 8 (Nov 11)	44,09,A6,66	550.6
Value 9 (Nov 12)	44,39,26,66	740.1
Value 10 (Nov 13)	44,07,6C,CC	541.7
CRC	A9,2A	

The response to the load profile query contains device address, function code and number of bytes data each of 1 byte, and then the requested parameters of 4 bytes each. Each parameter represents data over a period of a day when daily log is accessed and represents data over a period of a month when monthly log is accessed.
The response ends with 2 byte CRC.

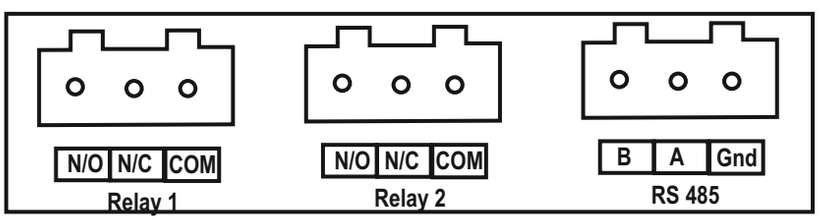
Note: If a user tries to access the data which is out of the range of the datalog i.e. more than 1 year before the present date for daily log and more than 14 years before the present date for monthly log, it will result in a modbus exception. The same will occur if a user tries to access the data before the starting date of the corresponding log or a future date.

5. Connection for Optional Pulse Output / RS 485/ Analog Output / Ethernet (rear view of the instrument) :

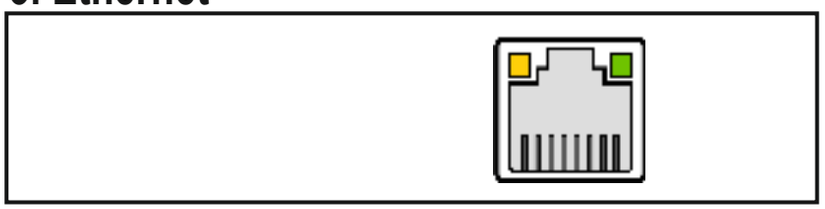
1. RS 485 Output + One Pulse (One Limit) + Two Analog Output



2. Two Pulse (Two Limit) + RS 485 Output



3. Ethernet



NOTE

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, ‘manufacturer’ has no control over the field conditions which influence product installation.

It is the user’s responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are those in ‘manufacturer’ standard Conditions of Sale for this product and in no case will ‘manufacturer’ be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.